TUMOURS OF THE KIDNEY

A Clinico-Pathological Study.

being

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by

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INTRODUCTION.

Kidney tumours possessing that specialized property of autonomy which may prove not only destructive to the kidney but malign to the body as a whole, are rare tumours - so rare indeed that one wonders if a doctor can remain efficient in the diagnosis of the disease in the early stages under such conditions. Cellular pathology has opened up a wide field for investigation of the nature of the tumour formation but so far the essential etiological factor has not been discovered. Many authorities have suggested different determining factors in different classes of tumours. Certain of the tumours found in the kidney are of extremely rare occurrence and others, such as fibroma, are from the clinical standpoint of no significance. Those of vital interest are the malignant tumours. The comparison of histories and pathological findings may be helpful in establishing those features which enable their presence to be identified clinically. The burning question, clinically, is that of the surgeon - is the tumour diagnosed in time? Both doctor and surgeon should remember Trousseau's dictum, "Il n'y a pas de maladies; il n'y a que des malades".

THE DEVELOPMENT OF THE KIDNEY IN RELATION TO TUMOUR FORMATION.

As a framework it is of interest to consider the

development of the kidney in relation to tumour formation. The development of the early secretory apparatus is two-fold - from the pronephros and the mesonephros. A number of tubules grow backwards into the intermediate cell mass opposite the last thoracic and upper lumbar vertebrae. Two on each side run back to the mass and drain into the body coelom. Short tubules show a minor degree of branching. All the tubules open in back. The mesodermal ridge is on either side of that line. The tubules eventually disappear. The Wolffian duct gives rise to a number of structures varying in the two sexes. In the male, the vas deferens, ejaculatory ducts, vasa efferens and epididymus arise from the Wolffian duct and its lower end drains into the urogenital sinus. The lower ends also form the ureter which buds off it. The trigone area of the bladder and the floor of the urethra are also formed from it. In the female the Wolffian duct atrophies almost completely. A rudiment is left as Gaertner's duct. It may persist as congenital abnormalities.

The metanephros forms the glomeruli, the upper part of each nephron, and the convoluted tubules. In the pelvis it is joined on either side from in front by buds from the Wolffian duct; these grow back into

the metanephros. The Wolffian duct gives rise to the ureter, pelvis, calyces and collecting tubules of the kidney. The blood supply is important: there is a double blood supply. The primary is from the pelvic vessels - hypogastric, common iliac or termination of the aorta. Early in its development the metanephros divides into two lobes. If it remains united, it is abnormal. There is a relative ascent of the kidney partly due to the caudal movement of the thoracic duct. The kidney ascends and rotates on the anterior aspect of the mid line; thus the pelvis is lying in front antero-medial to the kidney. The kidney ascends and gets its secondary blood supply from the aorta via the renal vessels. It gets its nerve supply in the same situation at the same time.

ANATOMY.

And now to revise the anatomy of the kidney. The kidneys are situated behind the peritoneum in the paravertebral recesses. In the male these spaces are deep and funnel-shaped; in females they are shallow and cylindrical (Bryan). The respiratory excursion of a normal kidney varies between one and one and a half inches. The kidneys lie opposite the bodies of the last thoracic and the first three lumbar vertebrae,

the right kidney being half an inch lower than the left.

Each kidney occupies the following regions:- the hypochondrium, epigastrium, lumbar and umbilical. The lower poles are found from one and a half to two inches above the highest part of the iliac crest. The hilum is situated on the internal border: it is the mouth of a deep recess, the sinus where are the renal vessels and the ureter. From before backwards the arrangement is vein, artery and ureter. The average dimensions of the adult kidney are - length, 4 inches; greatest breadth, $2\frac{3}{4}$ inches; thickness, $1\frac{1}{4}$ inches; and weight, $4\frac{1}{2}$ ozs. (slightly less in females).

Each kidney has a true capsule and is surrounded by perinephric fat outside the capsule. The fibrous capsule covers the exterior of the organ and lines the sinus. In health it can readily be stripped from the tissues except at the deepest part of the sinus. The adipose capsule also completely encloses the organ and dips into the sinus. Outside this is a strong layer of fascia - Gerota's or Zukerkandl's - formed from the condensed extraperitoneal fat. This fascia forms a definite layer behind the kidney and lateral to it. It blends with the kidney in front, forming a perpendicular tube. A small slip joining the two lamellae

intervenes between the upper pole of the kidney and the suprarenal, hence the suprarenal does not accompany a movable kidney.

The anterior relations of the right kidney are liver, second part of the duodenum, hepatic flexure of colon, small intestine and right suprarenal capsule. In front of the left kidney are the stomach, pancreas, spleen, jejunum, descending colon and left suprarenal. Behind each organ are the psoas quadratus lumborum, diaphragm and transversalis muscles, covered by their respective fasciae; the last dorsal nerve and subcostal artery; the ilio-hypogastric and ilio-inguinal nerves; the twelfth rib and the transverse processes of the first three lumbar vertebrae. The pleural cavity passes down below the last rib for a variable distance and so forms an important surgical relation.

In the renal sinus the upper part of the ureter becomes expanded as the pelvis. This splits into two or three main stems which in turn divide into short, cup-shaped recesses, the calices. From the hilum the ureter descends upon the psoas, crosses the bifurcation of the common iliac artery and enters the pelvic cavity. Here it passes anterior to the internal iliac artery, the obturator vessels and nerve, and the obliterated hypogastric. Lastly, curving inwards, it runs behind

the vas deferens, and descends on the posterior wall of the bladder, to enter that organ about one and a half inches above the base of the prostate. The ureters pierce the vesical wall very obliquely and open by two small slit-like orifices.

In the abdomen, the peritoneum and the ileum or the pelvic colon, lie in front of the ureter. It is also crossed by the spermatic vessels.

The length of the ureter is about twelve inches. The blood supply is mainly derived from the renal, spermatic, and inferior vesical arteries.

The lymphatics of the kidney communicate freely with those of the adipose capsule, and accordingly in renal sarcoma this capsule must be removed with the kidney. They drain into the lumbar glands, these being situated along the course of the inferior vena cava and the aorta. The abdominal section of the ureter drains into the lumbar nodes, whereas the pelvic portion sends its efferents to the iliac and hypogastric glands.

CLINICAL FEATURES.

Clinically the renal tumours give rise to symptoms and signs in relation to histological structure, size, rapidity of growth or invasion of tissues in the

neighbourhood.

1. Haematuria occurs when the growth extends into the pelvis or into one of the calyces, and ulcerates, with resultant bleeding - the blood finding an outlet via the ureter.

2. Pain may be caused by clots passing down the ureter producing a mild colic. A dull dragging pain, most marked in the affected loin, may be felt when the neoplasm is growing rapidly and extends along the vascular pedicle of the kidney. The tumour involves the nerves and later the neighbouring ~~vessels~~ muscles.

3. A Tumour may not be detected unless the patient is thin and easy to examine. It is often impossible to detect any alteration in the size and shape of the kidney, even when the growth is sufficiently large to alter the form of the organ. When there is a considerable tumour this can be felt on abdominal examination. Enlargement of the kidney on the right side will have the colon on its medial side. When the left kidney is enlarged it is medial to the descending colon - in other words the colon crosses to the lateral side of the kidney. As those tumours progress there will be a gradual enlargement of the abdomen, more pronounced on the affected side.

4. Varicocele in the male is due to a malignant

thrombus growing along the renal vein on the left side and affecting the spermatic vein.

5. Passage of tissue occurs when a papillomatous growth undergoes early malignant changes - the base becoming more sessile and so bits are easily broken off and washed out of the pelvis.

6. Urinary Symptoms such as frequency and urgency and sometimes dysuria, are present when the bladder becomes irritated by pieces of tumour or blood clot.

7. Anaemia may be secondary to loss of blood; high leucocytosis is often present.

8. Cachexia results when the growth has spread beyond the kidney. The patient's general condition will be good until then.

9. Fever is stated by Israel to occur in all malignant tumours of the kidney without relation to histological structure, extent, rapidity of growth or invasion of tissue in the vicinity.

PHYSICAL EXAMINATION.

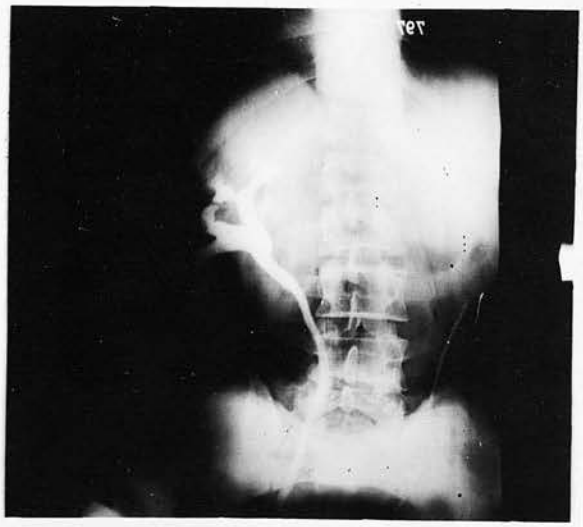
The physical examination includes.- (1) Palpation; (2) Examination of the urine; (3) Cystoscopic examination; and (4) Pyelography - retrograde and excretion urography.

It is often impossible to palpate a tumour of the

kidney unless of considerable size, and then it may be felt to be smooth or nodular firm or cystic, movable or fixed.

As a kidney growth is a strictly unilateral condition there is no impairment of renal function, so that tests for this do not help towards diagnosis. Sepsis is rare, therefore between the attacks of haemorrhage the urine will be normal. Bits of growth may be seen, however, in the urine, if the growth is breaking down. Apart from frank blood it is always necessary to examine by lens for microscopic blood if there is any suspicion of such. If clots of blood are passed and they are of worm-like structure it is fairly certain that the bleeding is of renal origin. Albumin will be present in proportion to the amount of blood in the urine. Chemical tests for blood in the urine are of little value.

Cystoscopic examination is very important. The patient is examined preferably when there is bleeding. The up-to-date cystoscope allows of the bladder being flushed out with lotion during the examination, so that the source of the haemorrhage may be established. If the haemorrhage is from a kidney, there is marked contrast between the blood stained efflux of the one and the normal urine from the other. Further



X-rays of Renal Tumours.

investigation is required to decide whether the blood comes from neoplasm or some other pathological condition of the kidney.

Pyelography enables the presence of a renal tumour to be recognised accurately; that is, the combined use of retrograde and excretion urography. Retrograde urography is the primary diagnostic aid for the presence of tumour of the kidney; excretion urography indicates the functional activity of the organ. The condition of the renal parenchyma in the vicinity of the tumour is indicated, thus providing a clue to the type of tumour present. Mr Wade says that the degree of malignancy of a tumour of the kidney is in inverse proportion to the functional activity of the organ as a whole, and this degree is made manifest by employing excretion urography. When the growth does not encroach on the pelvis as in perirenal tumours, pyelography is of little value. A plain radiograph of both renal areas in this case may show an extra shadow near the normal kidney outline.

THE PROBLEM OF DIAGNOSIS.

The problem of diagnosis may be considered from three angles, viz.-

A. When haematuria is the only symptom;

B. When there is a tumour without haematuria;

C. When there is both tumour and haematuria.

A sudden, painless, profuse haematuria in a person who looks well is suggestive of villous papilloma of the bladder as well as tumour of the kidney. But the growth within the bladder will be discovered on examining the kidneys by ureteral catheterization. Mr Wade describes the appearance of this tumour graphically - "like a tiny oak tree with its delicate branches waving gently in the clear water". But villous papilloma may be secondary to a similar tumour within the renal pelvis. In the London Hospital Clinic 743 consecutive cases were investigated by Debenham and he found that the commonest causes of haematuria in both sexes, from 45-65 years of age, were tumours of the bladder and kidney. Carcinoma of the kidney was the cause of 2.5% of all cases.

Apart from renal growth, the various other causes of bleeding from one kidney must be taken into account, viz., haemorrhagic nephritis, tuberculosis, hydronephrosis, but these can be excluded generally by the characteristic urinary signs and symptoms, and if those characteristics leave in doubt the causative lesion, X-ray examination and pyelography will prove of great value.

When there is a tumour without haematuria, as is frequently the case in the mixed tumours of children where the growth may be of great size without any ordinary signs or symptoms, certain extra-renal conditions will have to be considered. Malignant retroperitoneal glands may simulate the disease but they are central in position, with an area of resonance around. Renal tuberculosis will have urinary signs and symptoms and the kidney outline is irregular. Splenic enlargement such as in malaria, syphilis, leukaemia will be diagnosed by the blood examination. Hydronephrosis develops very slowly and there may be a sudden increase in size of the kidney. Tumours of the liver are frequently accompanied by jaundice, but a right kidney tumour under the ribs may compress the bile ducts and produce jaundice. The anterior border of an enlarged liver, however, is well marked and extends in a lateral line across the abdomen. Tuberculous peritonitis invariably accompanies other tubercular foci in the body and this may be distinguished from kidney tumour where there is also fluid in the abdomen.

Tumour and haematuria are the two cardinal signs of kidney tumour. But this syndrome is also present in congenital multiple cystic disease of the kidney.

The pyelogram will indicate the condition of the kidney. Both conditions may be present in the same kidney.

All available data must be studied - history, clinical features, urinary studies and, finally, cystoscopy and pyelography are essential in diagnosis.

PATHOLOGY.

Having decided that a tumour of the kidney exists, the question arises - what type may it be? A simple classification of kidney tumours is as follows.-

I. Of the Parenchyma -

A. Malignant:
(1) Hypernephroma
(2) Carcinoma
(3) Embryoma
(4) Sarcoma.

B. Benign:
(1) Adenoma
(2) Fibroma
(3) Lipoma
(4) Angioma.

II. Of the renal pelvis -

A. Malignant:
(1) Papilloma
(2) Epithelioma

B. Benign:
Papilloma.

III. Of the kidney capsule.

Certain of the more important characteristics of types will now be considered (1) from the clinical view; (2) from the pathology.

The following 26 cases of kidney tumours have been collected from a surgical unit in the Edinburgh Royal Infirmary, from the Edinburgh Royal Hospital for Sick Children and others from private practices of Edinburgh surgeons.

GROUP I.

HYPERNEPHROMA and CARCINOMA.

Case 1.

J.G.T., aged 54 years, was admitted to a ward in the Royal Infirmary, Edinburgh, on 28.12.25, suffering from retention of urine.

About three months previously the patient returned home one night and when he attempted to pass urine he found it difficult but was able to do so. On examining the urine, he found it was a dark reddish colour which he thought was blood. He had had no difficulty in passing urine before. He had a little supra-pubic pain with this and the difficulty and pain passed off in two days. The urine during this time was sometimes dark coloured and at other times clear. The patient afterwards had no difficulty in micturating but he noticed that his urine was very different from normal.

Ten days before admission he woke up with a desire to pass water. He was able, however, only to pass a very little, which came away in drops. This was highly coloured, being dark-reddish. He consulted his doctor who sent him to the Royal Infirmary, where a red rubber catheter was passed and the urine drawn off. After this the patient passed coloured water every time for the succeeding five days, when he again had some difficulty in beginning the act. His urine became quite clear, he could pass it quite easily and thereafter he had no trouble at all. Since the commencement of his complaint the patient had been passing urine frequently. He had also passed clots at various times. He never complained of much pain, only a little in the hypogastrium when he could not pass urine and it was completely relieved after he emptied his bladder. He had no pain in the kidney regions nor in the line of the ureters. There had been no shooting pain but occasionally there had been a burning pain in the penis during micturition. The patient had lost a good deal of weight. His appetite was fairly good.

Physical Examination.

From his appearance, patient appeared to have lost some weight. The abdomen was protuberant and asymmetrical, there being a fulness in the left lumbar

region. The abdomen moved freely on respiration. The umbilicus was protuberant. There were several De Morgan spots over the patient's body.

On palpation, patient relaxed all his abdominal muscles. There was a large, roundish swelling, about five inches long and four inches wide, in the left lumbar region. This swelling extended to about one finger's breadth from the umbilicus. It was firm and smooth but had little knots on its surface. There was no tenderness in the abdomen even on fairly deep palpation. The swelling was crossed by the bowel. There was no ascites present.

The patient had a small hydrocele on the left side which he stated was of comparatively recent development.

Circulatory and other systems.

Nothing was detected.

Diagnosis.

Hypernephroma of left kidney.

Operation - 31.12.25.

The anaesthetic used was chloroform and ether. The patient was put on his right side with an Edebohls' air-cushion under him. An oblique incision was made, extending downwards and forwards from the angle between the sacro-spinalis and the last rib towards the umbilicus. The various layers of muscle were cut through, the

perinephric fat exposed and the vessels, as they were cut, were caught. The tumour was found to be adherent above posteriorly to the peritoneum and below to the perineum. The various adhesions were freed, and the freeing of these adhesions resulted in a very considerable amount of haemorrhage. A hand placed on the anterior abdominal wall was made to force the tumour upwards and by this means the tumour was eventually freed. The pedicle of the tumour was clamped by numerous Mayo's forceps and the tumour eventually removed. The various vessels and the pedicle of the ureter were tied off. A large dead space was left. There was some suspicion of disease left in the pedicle of the kidney. The peritoneum was opened inadvertently at one small point and closed immediately.

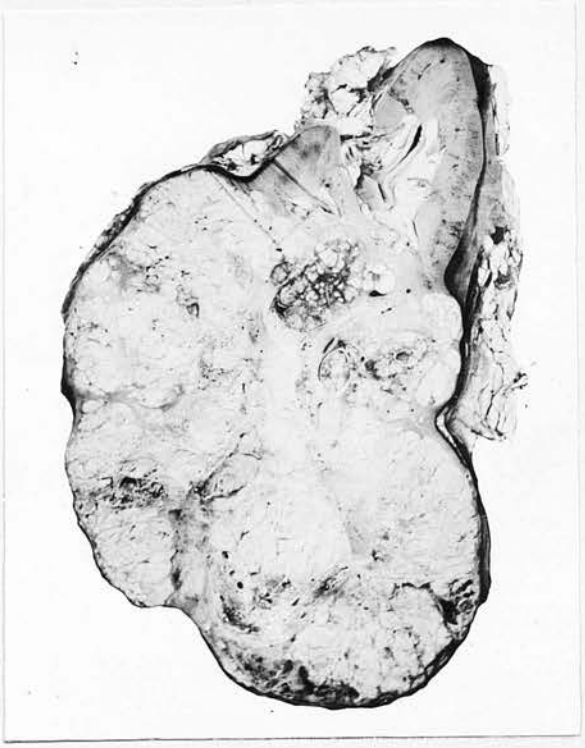
The abdomen was then closed, the muscle layers being brought together by continuous cat-gut sutures. The skin was closed by Michel clips and silkworm-gut, four large drains having been inserted into the dead space.

"Excision of Hypernephroma, Left".

Progress.

The patient passed urine 24 hours after the operation but none on the second day. He was given plenty of fluid and catheterized; 8 ozs. were found in the

Case 1. Mr. Telford.



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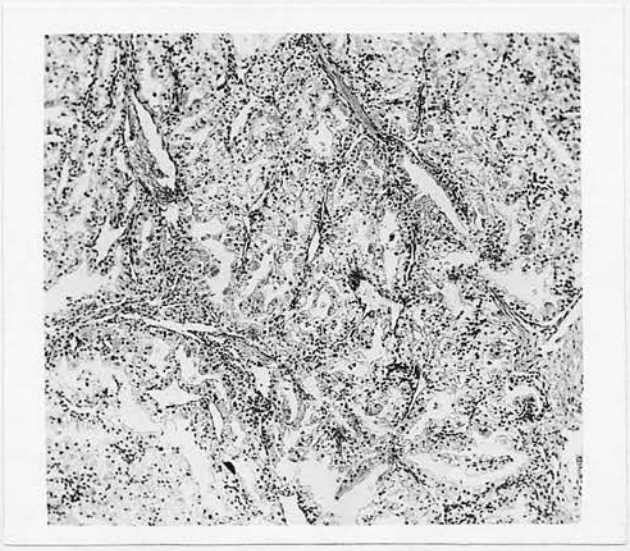


X 70.

The cells of this tumour are large, with somewhat "foamy" cytoplasm and small hyperchromatic nuclei comparable to the cells seen in a hypernephroma. Here however there is differentiation of the tumour both papilliferous and adenomatous areas being present. The tumour is in the nature of a Papillary adenocarcinoma of the kidney.

bladder. Thereafter there was no trouble with the urine.

The wound began to discharge serum and later some purulent material. This condition gradually improved and in two weeks the lower sinus had closed.

The patient was discharged on 26.1.26 with the wound soundly healed.

Pathological Report.

Sections showed portions of normal renal tissue and of tumour.

The tumour was composed of very pale, large, vacuolated cells, with well staining nucleus containing a considerable quantity of chromatin. The cells seemed in places to be arranged in papillary processes with a few even carrying blood vessels. In places there appeared to be a formation of lumina. In some parts there was a strong fibrous tissue retraction. The tumour resembled the so-called papillary carcinoma of kidney or hypernephroma.

Case 2.

J.S., aged 60 years, was admitted to a ward in the Royal Infirmary, Edinburgh, on 2.12.28, complaining of pain in left shoulder and in abdomen.

The patient said that nine weeks before he suddenly lost his appetite and began to feel a vague discomfort in the stomach, accompanied by nausea. This had continued. He had never vomited but he had often felt like it. He was much troubled with flatulence and a feeling of distension. No water brash nor heartburn was experienced. He had lost much weight in the previous two months. The bowels were very constipated but he had noticed no blood nor slime in the stools. He had no attacks of diarrhoea. He had noticed his stomach becoming very distended. He said he had a tinge of jaundice. He complained of frequency of micturition. There had been no pain nor difficulty in passing urine.

Six weeks previously he had noticed pain in the left shoulder. This pain was very severe and "knife-like" in character. The shoulder had never swollen up. Gradually the condition became very severe and patient was unable to lift the limb from the shoulder. He said there had been no violence to the arm. The shoulder never became very discoloured. There was no feeling of heat in the part but it was very tender to touch. Suddenly he found he was unable to lift it.

There was nothing to note about his previous health.

Physical Examination.

The abdomen was prominent and flabby. It moved freely on respiration. On palpation there was no rigidity nor hyperaesthesia. There was slight tenderness on the left side of the abdomen. A tumour was present here just on the left side of the umbilicus. The edge was indefinite; it did not move freely on respiration, being fairly fixed. There was a tympanitic note over it. There was no free fluid. The liver and spleen were not enlarged.

Per rectum - The prostate was enlarged and fairly soft. There were no nodules. The leash was not palpable.

The acromio-epicondylar measurement was half an

inch longer as compared with right. There was no obvious deformity until the arm was handled; then abnormal mobility was apparent and crepitus could be elicited at the junction of the proximal and middle thirds of the humerus. The patient could not move the humerus actively without pain and the arm could not be abducted. Movements at elbow and wrist were present, but mostly painful. There was no obvious swelling.

Palpation of the part caused great pain but no tumour could be palpated. There was no increase of local temperature. There were no signs of dislocation of the head of the humerus.

Circulatory and other Systems.

Nothing noted.

Diagnosis.

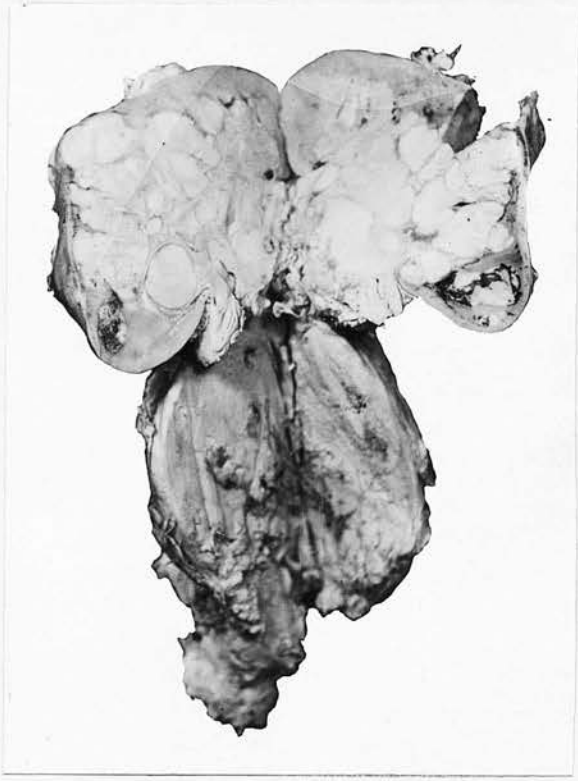
Malignant disease of kidney with secondary growth in left shoulder.

Operation - 17.12.1928.

Ether was administered. An incision was made over the site of the fracture, extending from the acromion down for five inches. The muscles were split and retracted. The fracture was exposed and some of the tissue was removed with a spoon. The wound was closed in layers.

"Diagnostic Excision of portion of tissue, left upper arm."

Case 2. Mr. Smith.



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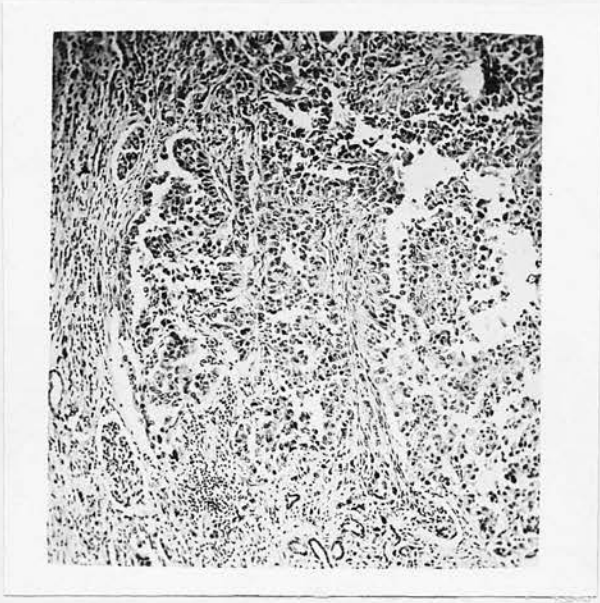


X 70.

There is little tumour differentiation and extensive necrosis.

Progress.

As a result of the pathological examination of the portion of tissue removed from the arm the condition was diagnosed as sarcoma. It was thought that the swelling in the abdomen was probably due to enlargement of the kidney, possibly by a tumour. Patient's condition, however, was such that it was not thought advisable to subject him to a pyelographic examination. The bismuth meal proved negative.

Patient's condition gradually became worse. He lost strength and his pulse became poor and he appeared to take fainting attacks.

3.1.29.- His condition became very much worse and he collapsed and died.

Post-mortem Report: Organs Involved.

Left kidney was rather small and very nodular on the surface. On section, the main mass of the normal kidney tissue had been replaced by tumour growth. This consisted of rounded, firm white masses of varying size. None of them showed necrosis in the centre, but haemorrhage had occurred into a nodule near the lower pole. Only a small patch of normal kidney tissue remained and this was at either pole. Even the pelvis was involved and the growth extended right out to the capsule.

Buried in the perinephric fat immediately below, but quite separate from the left kidney, was a nodular malignant mass. In size it was slightly larger than the kidney. It was encapsulated and the surrounding fat could be stripped off it. On section, it had the same characteristics as the nodules found in the kidney, but in the centre of the mass extensive necrosis had occurred, so that it consisted of a soft pultaceous substance. One or two haemorrhages were also noticeable in the interior.

About half way down the left ureter there was a small white nodule about the size of a hazel nut. It had grown rather to the side of the ureter and was not adherent to the surrounding structure.

The right kidney was also rather small in size. The cortex was somewhat narrow and there was a lack of definition between cortex and medulla. There were no malignant nodules present.

Right Lung.- Contained several metastatic nodules of varying sizes, white in colour, and very hard and discrete. Apart from the tumour masses, the lung showed only some basal congestion.

Left Lung.- Was small, due to partial collapse. It also had a few secondary nodules scattered through it.

Left Humerus.- There was a pathological fracture of the surgical neck due to invasion of the bone by malignant growth. The tumour had extended into the surrounding muscles, more especially those near the bicipital groove. The growth was hard, white, and had much the same appearance as the nodules found in the left kidney and in the lungs.

Sections from the organs involved were prepared, and showed.-

Left kidney - extensive involvement by malignant cells. The cells were epithelial in type and had a definite tendency to acinar arrangement, although in some parts there was rather a central fibrous core with the epithelium covering it. The cells were large and irregular in outline, with well defined nuclei in which the chromatin network was very open.

Humerus.- The section prepared from the growth in the humerus showed the same type of cell. There was not quite so definite an arrangement of the cells and there was much less differentiation. Many cells were showing mitosis.

Lung.- The nodule in the lung was composed of the same type of epithelial cell.

Adeno-Carcinoma of Kidney, Lung and Humerus.

Case 3.

J.G., aged 58 years, was admitted to the Edinburgh Royal Infirmary on 22.11.30, complaining of pain in the right loin and vomiting.

About three months previously the patient began to be troubled with pain in the right lumbar region posteriorly. The pain was gnawing in type, constantly present and though never very severe was bad enough to keep him awake at times. It had no radiation to the pelvis, urethra or shoulder. The patient was able to attend to his work up to one month before admission to hospital. One day he passed very dark coloured urine, which persisted for two days. He was told by his doctor that the urine contained blood and since that time he had kept in bed off and on. He had not noticed any darkness of the urine except at that time. There had been no frequency of micturition and no dysuria. For a month or so his appetite had begun to fail and for a while he did not fancy any food at all; at the same time he began to be troubled with vomiting which occurred after every meal and which had persisted at times since then. This had not been accompanied by any pain in the stomach or elsewhere. He had lost a great deal of strength and he stated that he had lost considerably in weight, having weighed

17 st. at the time of his discharge from the Army in 1 917. For about two years he had been troubled by a dry cough without any sputum. Lately this had become rather worse, but there had never been any spitting of blood. He had been unduly breathless on exertion for about six weeks and he had felt his legs weak on walking. Since the war he had suffered from what he described as "rheumatic pains" in both legs but this had not got worse recently. There was no pain in the spine. The bowels were habitually regular.

His previous health had been good save for a severe attack of influenza forty years ago.

Physical Examination.

The patient was a thin man who bore the signs of suffering. He complained of a constant pain in the right lumbar region. He had a short dry cough which he stated was almost constantly present. There was no cyanosis of the lips or ears and no oedema.

On inspection of the abdomen, there was visible a fulness in the right flank just below the costal margin. Otherwise the abdomen was symmetrical. The movement was unrestricted during respiration. No hyperaesthesia was elicited.

There was no increase of muscular tone, and no tenderness was found in the epigastric, left

hypochondriac, left lumbar, hypogastric, or umbilical regions, but in the right hypochondriac and lumbar regions there was marked muscular hypertonus and tenderness both anteriorly and posteriorly in the kidney angle. On bimanual palpation a considerable mass was felt. This was slightly mobile, apparently smooth and had all the features of a renal swelling. No hepatic enlargement was found. The spleen was impalpable. There was no increase of splenic dulness.

The heart was not enlarged. The sounds were faint but in all areas pure and closed. The pulse was regular, but the volume was poor. The arterial wall was grossly thickened.

The chest was narrow. Marked supra and infra clavicular hollowing was present. In the right apex the breath sounds were harsh, vesicular, unaccompanied. In the left lung the breath sounds in all areas were vesicular and unaccompanied. There was no alteration of vocal fremitus.

There were no abnormal constituents in the urine.

The urological examination showed a definite filling defect in the right kidney pelvis, the condition suggested being one of hypernephroma.

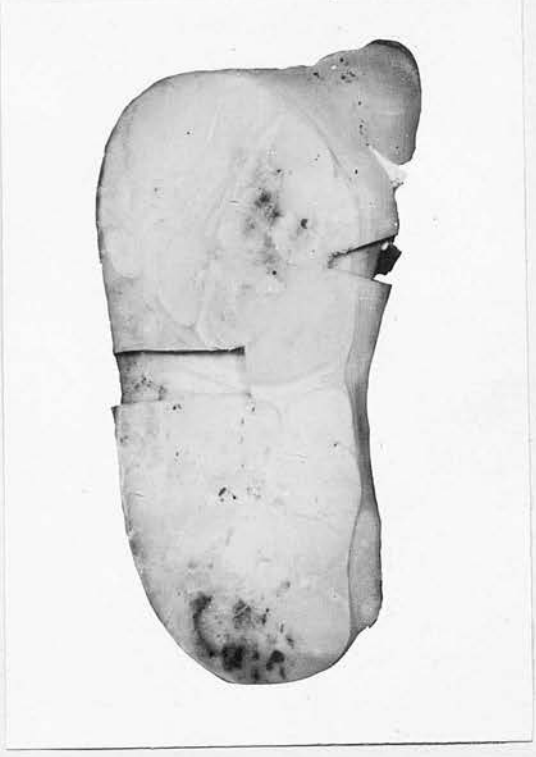
Diagnosis.

Hypernephroma of right kidney.

Operation - 25.11.30.

The anaesthetic used was percain. The patient was placed on the operating-table on his left side and a von Bergen incision was made in the right renal region, commencing at the posterior kidney angle and extending to the crest of the ilium in the mid-axillary line; the incision at the commencement was vertical, to give better access. The latissimus dorsi was exposed and divided, care being taken to preserve the 12th intercostal nerve. The 12th rib was exposed, the periosteum was elevated and the rib divided as close to the spine as possible, the rib being then removed. The internal oblique and transversus were then divided in the line of the skin incision and the renal tumour exposed. It was found to be a very large, hard and nodular tumour. It was separated with difficulty from the surrounding structures. It was found to be adherent to the diaphragm and the liver above and in its anterior and medial part it had perforated. The vessels were ligated and the tumour was removed. The tumour was about the size of a foetal head. As much as possible of the necrotic material was removed. There was found to be a few nodules in the liver. The muscles were sutured with interrupted catgut and the skin edges were approximated with silkworm gut and

Case 3. Mr. Gribben.



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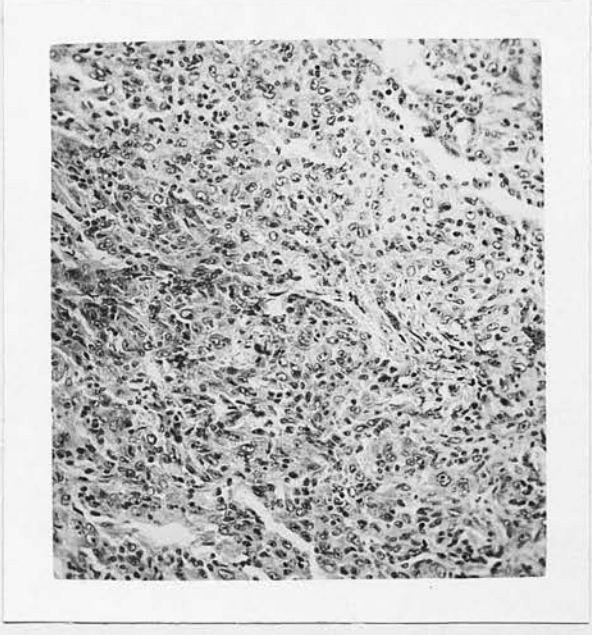


X 100.

The tumour in this case is completely undifferentiated. The cells are for the most part spheroidal in shape.

clips, a rubber dam drain being inserted to the area and a small acriflavine pack to control some oozing.

"Right nephrectomy with removal of tumour".

The patient showed slow but steady improvement and remained fairly well until the fifth day after operation, when he developed signs of bronchial pneumonia on the left side and died on the following day from general peritonitis.

Pathological Report.

The cells of the tumour showed lumina and papillary formation. The cytoplasm was markedly granular. The nuclei were small, with pale-staining well-marked nucleolus. In places the cells formed a syncytial mass.

Case 4.

W.S., aged 48 years, was admitted to the Edinburgh Royal Infirmary on 4.2.31.

Occupation: Bus-Driver.

Complaint: Inability to pass water.

Duration - six days, intermittently.

The patient was in good health until six days before admission. On that morning he got up to pass water and failed to do so, only a thin trickle of blood coming away. He said the blood was not bright

red but of a brownish colour; there were no clots present. He compared it to a nose starting to bleed. For about ten days prior to the appearance of blood he had noticed that his water was of a "dirty" colour and not clear. During this time he had no frequency, polyuria nor difficulty in any stage of micturition. He had no pain with the bleeding and he passed his water without difficulty, but he noticed that it was reddish in colour on one occasion. After that, his urine was quite normal in appearance except for a few clots and he had no further trouble with his water until the morning of admission, when he had a precisely similar attack - only a thin trickle of blood coming away and no urine. About an hour and a half after this, at 10 a.m., he began to have pain over the suprapubic region which he recognised as being due to a distended bladder. This pain increased until 1 p.m., when he was admitted to the Royal Infirmary.

His bowels were regular and his appetite good. There was no loss of energy or weight.

Previous Health: Two years before he had rheumatism in knees, ankles and hands and was off work for eleven weeks. Apart from that, there was no illness of note.

Physical Examination: Patient was in good general

condition. He was well built, with a tendency to fat. Teeth bad, pyorrhoea and some caries: Tongue clean and moist: musculature good.

Local Examination: Abdomen.-

Inspection - There was prominence of the lower half of the abdomen, with diminished movement.

Palpation - A firm tumour was palpable below the umbilicus. There was a dull note on percussion. There was no tenderness in kidney angles. The kidneys were not palpable.

Per rectum - No abnormality was detected.

External Genitals - Hypospadias.

Circulatory and other Systems: Nothing abnormal was detected.

Diagnosis: ? Papilloma of bladder.

Progress: On admission patient was given a hot bath, which enabled him to pass urine, the first for that day. It was again of a reddish colour. Since admission patient had no trouble or pain with his water, passing it when he desired.

Operation - 10.2.31.

(Chloroform and Ether.) With the patient in the Trendelenberg position, a right paramedian incision was made below the umbilicus. The peritoneum was reflected upwards. The bladder was then exposed and

found to be greatly extended. A trochar and cannula were inserted and the bladder drained. The bladder was then opened by means of a cautery and a large quantity of blood and blood-clot was removed. There was found to be a steady haemorrhage from a haemangioma involving the posterior wall of the bladder. Bleeding points were cauterized and a flavine pack and a rubber tube were inserted into the bladder, a small rubber-dam drain being inserted down to the bladder. The abdomen was closed in the usual way.

"Cauterisation of haemangioma of bladder with supra-pubic cystostomy".

Treatment: 20.2.1931.

(Chloroform and ether.) The suprapubic tube and pack were removed. The bladder was swabbed and a stent mould fitted with two 5 mgm. tubes and seventeen 1 mg. and six .5 mgm. needles of radium was inserted into the bladder, lying in apposition with the posterior wall. The stent was fixed in by means of two wires which were secured above the abdominal wound with further stent wax. A urethral catheter was then inserted and tied in position.

"Insertion of Radium to Bladder".

Progress: 30.3.31.

Patient made a slow but steady recovery, the urine becoming free from blood. The supra-pubic tube

was slowly closed with a clip, patient beginning to pass urine naturally. The tube was removed on 26.3.31 and patient was allowed to get up. He passed a small quantity of urine but a large quantity escaped through the supra-pubic wound. Since that date he gradually passed more urine per urethra.

Discharged 15.4.31 with very slight occasional moistening from the supra-pubic wound. General condition satisfactory.

Readmitted 29.5.31.

History: Patient was admitted to another ward ten days before, complaining of extreme pain on micturition with the passage of clots of blood and at times almost complete retention of urine. A catheter was passed and the pain thereafter abated, only to reappear when the bladder again required emptying. A catheter was accordingly inserted and retained in position. Patient was discharged in six days time, free from symptoms, passing urine per urethra.

He was readmitted to the Royal Infirmary on account of a return of symptoms, with the passage of blood and some fairly large clots.

Physical Examination: On admission the urethra appeared to be blocked with clots as patient was passing urine through the supra-pubic wound, along

with considerable clots of blood. There was also some slight gelatinous sloughing material exuding from the supra-pubic wound.

Progress: The catheter was passed several times, no urine being withdrawn, the urinary passage evidently being blocked by clots of blood.

Diagnosis: Sloughing of bladder following Radium insertion.

Treatment: 5.6.1931. (Percain)

A large catheter was passed per urethra through the hypospadias and the glans penis stitched over the catheter. The supra-pubic wound was then cleansed and the edges excised, being then brought together with silkworm gut.

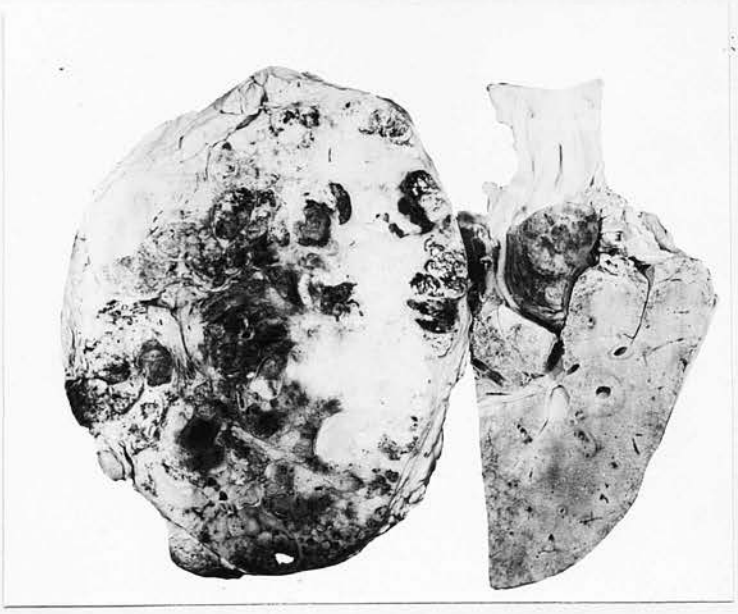
"Closure of supra-pubic wound and institution of urethral drainage".

Progress: It was found that the urethral catheter was not draining the urine escaping through the supra-pubic wound. Fluid could be instilled into the bladder through the urethra but none could be drawn out. Further operative treatment was decided upon.

Operation - 13.6.31. (Chloroform and Ether)

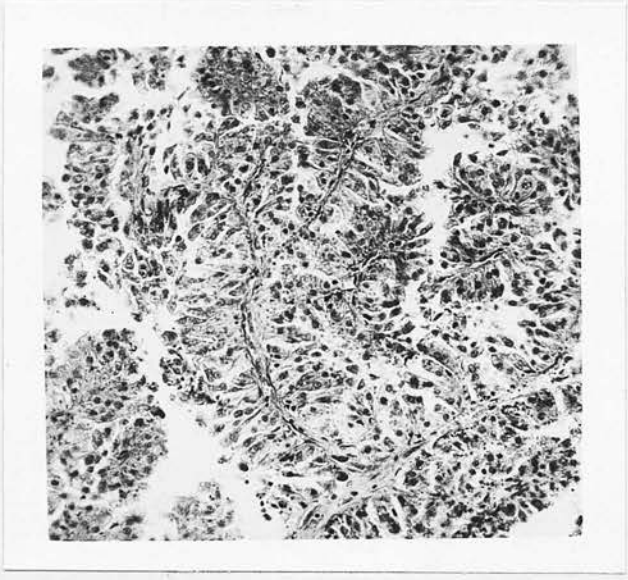
The stitches in the supra-pubic wound were cut and the wound reopened. A large Pezzer catheter was then inserted into the bladder and secured in position by a catgut stitch. It was found on opening the

Case 4. Mr. Scott.



1/3rd. natural size.

Note large malignant embolus in portal vein.



X 100.

Papilliferous adenocarcinoma of the kidney.

bladder that it contained a large amount of muco-purulent material.

"Supra-pubic drainage".

Progress: Following the last operation the patient continued to pass blood-stained urine but was fairly comfortable.

25.6.31 - He suddenly collapsed and died in a few seconds.

Post-mortem examination showed that death was due to cardiac failure.

Post-mortem Report:

The tumour was a papillary adeno-carcinoma.

Carcinoma of right kidney, with growth into the renal vein, and inferior vena cava.

Pyelonephritis of the left kidney.

Congestion of the bladder.

Cloudy swelling of the myocardium and liver.

The right kidney was enlarged to about three times its normal size, and was rather irregular in shape. On section it was found that practically the whole of the renal tissue had been replaced by yellowish nodules of tumour growth. These nodules were of various shapes and sizes, so that the surface of the kidney presented a very variegated appearance. It was impossible to distinguish cortex from medulla.

The pelvis also had been largely destroyed. The capsule stripped with comparative ease and exposed a nodular yellowish surface.

The tumour tissue was found to have grown into the renal vein, and from thence to the inferior vena cava. It had grown upwards to the base of the liver but did not extend into the liver itself. The tumour had also grown down into the right common iliac vein.

Case 5.

R.J., aged 57, was admitted to a ward in the Royal Infirmary, Edinburgh, on 28.10.31 suffering from swelling in scrotum.

In February the patient noticed a swelling in the scrotum on the left side. At the time he was suffering from bronchitis and he thought that the cough was the cause. The swelling increased in size up till June and then it remained stationary. Two months before admission the swelling again began to increase in size. The patient was troubled with pain and a feeling of weakness on walking. He began to be very constipated in May and had to take medicine frequently to relieve the condition. The patient had had no trouble with constipation previously. He had never had abdominal pain. His appetite was poor. He had

lost four stones in weight since February. Since March the urine was seen to be occasionally brown in colour. The patient had noticed a soreness in the left side of the abdomen on turning quickly and occasionally, when walking, since about April, but this was never very painful. He complained of occasional bouts of pain in the epigastrium, coming on one to three hours after food, and some flatulence but no vomiting.

Physical Examination.

The patient was a very anaemic man who looked older than he was. No abdominal swelling was visible. On palpation there was tenderness in the left kidney angle, especially posteriorly. In his left kidney region and under the left costal margin there was a palpable fixed hard mass. There was no enlargement and no nodulation of the liver, nor enlargement of the spleen. There was dulness in the left kidney region, extending upwards under the left rib to the level of the 7th rib in the anterior axillary line. There was a hard fixed swelling situated just to the left of the vertebral column at the level of the 10th, 11th and 12th thoracic vertebrae. The swelling was about the size of an apple. It was not fluid.

There was considerable swelling on the left side

of the scrotum. On palpation, the scrotum was felt to contain a mass of tortuous veins above and on the lateral side of the testicle. A firm round mass the size of a hazel-nut was present in the upper part of the scrotum, which was quite distinct from the testis.

The patient had suffered from bronchitis more or less continuously for years. There was some degree of emphysema. The breath sounds were harsh, vesciular and loud.

The heart was slightly enlarged on the right side. There was a loud systolic murmur at the mitral area. The other sounds were pure.

Nothing abnormal was detected in the other systems.

The patient was referred for cystoscopic examination. He was examined with an F 21 cystoscope which was passed without difficulty. A sample of urine was obtained from the bladder and thereafter the bladder was filled with clear boric solution. It held 300 cc.s without discomfort. On examination no gross abnormality was found in relation to either the trigone or the urethral orifices and, beyond a certain amount of trabeculation, the vault was normal. Urethral catheters were passed up on each side. On the left side the catheter passed for a distance of 35 cm.s but

on the right side its upward progress was arrested at the normal level of 30 cm.s. Clear urine was obtained from the right side and the rate of flow was normal, but on the left side there was a considerable escape of blood. Iodide was injected: on the left side the patient tolerated without discomfort 20 cc.s; on the right side the pelvis only held 10 cc.s.

The pyelograms revealed an abnormality in relation to the left kidney. The pelvis was distorted and lay in a vertical plane. The upper minor and major calyces were obliterated and a large renal shadow in relation to the pelvis could be seen.

Bacteriological Examination: No gross abnormality was noted.

The conclusion arrived at was that the case was one of renal tumour.

Diagnosis was Hypernephroma, left kidney, with secondary tumour in lumbar spine.

Operation - 3.11.31: (Gas and oxygen anaesthesia)

The abdomen was opened by means of a left transverse incision nine inches long. When the peritoneal cavity was opened, a quantity of free fluid and a large tumour were found, the tumour originating in the left kidney but spreading throughout the upper left quadrant of the abdomen and across the posterior wall. The

condition was quite inoperable.

The patient was discharged on 20.11.31, with the wound soundly healed. He was rather anaemic but the general condition was satisfactory.

Case 6.

Mrs E.S., aged 47 years, was admitted to the Royal Infirmary Edinburgh, on 26.6.34, complaining of pain in the right side.

Suddenly, one hour before admission, the patient was seized with a severe stabbing pain in the right iliac fossa. The pain showed no tendency to radiation and was unaffected by any external factor. It doubled patient up. The pain was still present but had been relieved by a morphia tablet. There had been no vomiting. The bowels, which usually moved regularly, last moved the day before and the motion appeared normal. There were no urinary symptoms. A period started that morning, which was the expected date. Although the acute symptoms only started one hour before, the patient had not been herself for some time. She was last perfectly well two months before. At that time, however, she began to be troubled with vomiting, which came on generally some hours after food. This was associated with epigastric discomfort

which was relieved by the vomiting. The vomiting occasionally occurred first thing in the morning, before breakfast. The vomiting was generally yellow fluid material. At the same time, patient began to feel a weight on her right side and to have a sensation of something slipping about there when she moved. Finally, frequent stabbing pain began to be noticed which radiated up and down the right side and was exacerbated by movement. The symptoms of pain, vomiting and a moving mass had continued without any variation. During this time the appetite had remained good and the bowels had been regular. There had been no urinary symptoms at all. There had been no cough nor breathlessness. The period one month previously lasted four days longer than usual but this was the only gynaecological symptom. Sleep and the power of concentration had been unimpaired. There had also been loss of weight and strength. There was no history of headache or of unduly impaired vision.

Her previous health had been good. She had 12 children and seven miscarriages. The patient looked rather thin and pale and was obviously in pain.

The abdominal wall moved fairly well on respiration. There was a fulness in the right upper quadrant. The hernial areas were all closed.

On palpation, there was a degree of muscular atonia and no rigidity. The pelvic colon was not palpable. There was a large, firm, nodular swelling which disappeared under the right costal margin and extended down below the umbilicus for two inches on the right side. It did not cross the mid line. It moved considerably on respiration and was slightly tender. On deep percussion it gave a dull note. There was slight guarding and tenderness in the right iliac fossa over an area corresponding to McBurney's point and also in the right loin. The liver and splenic dulness was normal and there was no hyperaesthesia or free fluid.

The heart sounds were slightly impure in the mitral area but no murmur was detected in any area and the volume of the sounds was good.

Other systems: Nothing abnormal was detected.

Diagnosis: Multiple cystic disease of the kidney, right; Parovian cyst, right.

Operation - 29.6.1934. (Ethyl Chloride & Ether.)

The abdomen was opened by a right gridiron incision. The peritoneum was incised and no free fluid was discovered. The appendix was found in the retrocaecal position. It was rather long and was slightly congested but it did not appear sufficiently

pathological to account for the symptoms complained of. The appendix was removed in the usual way and the carbolised stump invaginated.

Further exploration revealed a greatly enlarged right kidney which showed multiple cystic deformity. It appeared to be rather fixed at its upper pole. There was also a parovian cyst on the right side, and this was punctured and the fluid contents evacuated. No other abnormality was discovered and accordingly the wound was closed in layers, the skin edges being approximated with silkworm gut and clips.

"Exploratory laparotomy with appendicectomy and puncture of parovian cyst for multiple cystic disease of kidney and parovian cyst, right."

Progress.

Patient made an uninterrupted recovery following operation. A urological examination was carried out.

Urological Report. 11.7.34.

Sod. iodide injected - 30 cc.s on right, without discomfort; 12 cc.s on the left.

X-rays - The left kidney appeared to be healthy. On the right side there was a complete obstruction in the upper part of the ureter which, in combination with the retroperitoneal swelling felt at operation, indicated the presence of a closed right hydronephrosis.

Discharged 10.7.34 with the wound soundly healed

and the general condition satisfactory.

The patient was re-admitted on 26.10.34 suffering from swelling in the right side ever since operation in July. The swelling on the right side had steadily increased in size. It was unaccompanied by pain but she had been troubled with continual "retching" since leaving hospital. She had only been sick on two or three occasions - usually after her evening meal. She had been sick just prior to examination.

She said that during the last few months she had felt "done" after walking short distances, and was easily breathless. She had noticed that she had had attacks of giddiness now and again during the last two or three months, and was troubled with headaches over the temples. She said she had lost weight.

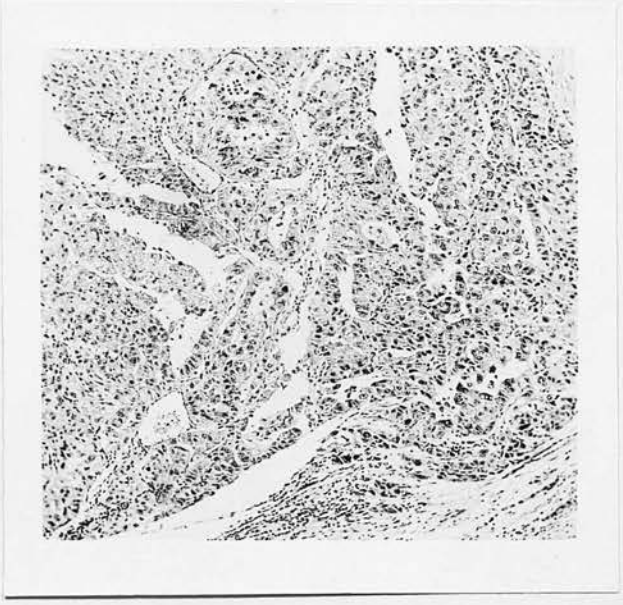
There had been amenorrhoea for the last two months. Prior to this she had two periods per month for July and August but each period was then lasting only one or two days.

The patient looked tired and had a sallow complexion.

The abdominal wall moved freely on respiration. There was the scar of a right grid-iron incision. There was a large swelling in the right iliac fossa which extended up as far as the right costal margin,

Case 6. Mrs. Sweeney.

½ natural size.



X 70.

This is a partially differentiated tumour showing a somewhat tubular arrangement of the cells on the left of the photograph.

Adenocarcinoma of Kidney.

and reached nearly to the mid line. It moved with respiration. It was regular in outline and fairly hard in consistence. It yielded a dull note on percussion. There was slight tenderness at its lower and outer border, and more marked tenderness opposite and below the tip of the ninth costal cartilage. Dulness was continuous with the loin dulness.

The pulse was of high tension. There was a short sharp first sound in the mitral area.

Diagnosis: Adeno-carcinoma of kidney, right.

Operation - 27.10.1934. (Ethyl Chloride & Ether)

A right oblique loin incision was made. The kidney was exposed and was found to be very adherent to the surrounding tissues. The adhesions were separated with difficulty. At the upper pole the tumour apparently had perforated the kidney capsule and extended upwards towards the liver, where it was densely adherent. The tumour in this region was opened into and soft mushy material extruded. From this area there was a considerable amount of bleeding. This was at first considered to be vena cava but as the bleeding was easily controlled and was not in great quantity, it was considered later to be probably arising from the smaller veins. Forceps were applied high up and no attempt was made to tie off the

bleeding-point. The kidney pedicle was separated and the tumour removed. It was more localised than had been thought, being well localised except over the upper part. The forceps were used as a drain and no drain inserted. The wound was then closed.

"Nephrectomy, Right."

The patient was pretty shocked following the operation. She was given a blood transfusion after the operation and thereafter improved considerably. She was discharged on 4.12.34 to a Convalescent Home, with the wound soundly healed. A month later she reported and her progress was satisfactory, but on the following month she complained of constant pain in the lumbar region, which would be due to a secondary deposit. Pain in her leg had probably a similar origin. Nothing more could be done surgically for her. Sedatives were suggested.

She died on 9.5.35.

Case 7.

Mrs C.P., aged 66, was admitted to a ward in the Edinburgh Royal Infirmary on 10.8.31.

Complaint: Feeling of discomfort in abdomen - six months duration.

History: About six months previously the patient

noticed a swelling in the abdomen. The swelling gradually increased. There was no actual pain in the abdomen, but a feeling of sagging and discomfort. The digestive system was in good condition - no nausea, no vomiting. The bowels had been regular until lately, when constipation was sometimes experienced. There were no urinary symptoms. The menses had ceased sixteen years before.

Previous Health: Hernia - right inguinal - 30-35 years. Had an accident - concussion - several years ago: no rheumatism: no pneumonia.

Examination.

General: Patient was a well built, florid woman of a garrulous nature. Her memory was very poor and intelligence lower than usual. She said that her poor memory resulted from accident to the head.

Local: The abdomen showed a large swelling on the right side, to the right of and below the umbilicus. It was about the size of a melon. It was smooth in outline and firm and elastic in consistence. A fluid thrill could be made out. There was a little tenderness on the right side. It was not attached to the anterior abdominal wall but was attached to the posterior structures, over which it could only be slightly moved. The hand could be inserted between the

swelling and the ribs and between the swelling and the pelvis with ease. The swelling was dull on percussion and was limited above by the resonant colon.

The other areas in the abdomen showed no abnormality. The liver was not palpable. There was no rigidity nor tenderness over stomach, gall bladder or kidneys. Spleen and kidneys were not palpable - if normal. There was a small right inguinal hernia which was a little tender.

Other Systems.

Circulatory, respiratory and urinary - nothing abnormal noted.

Pyelogram - 13.8.31.

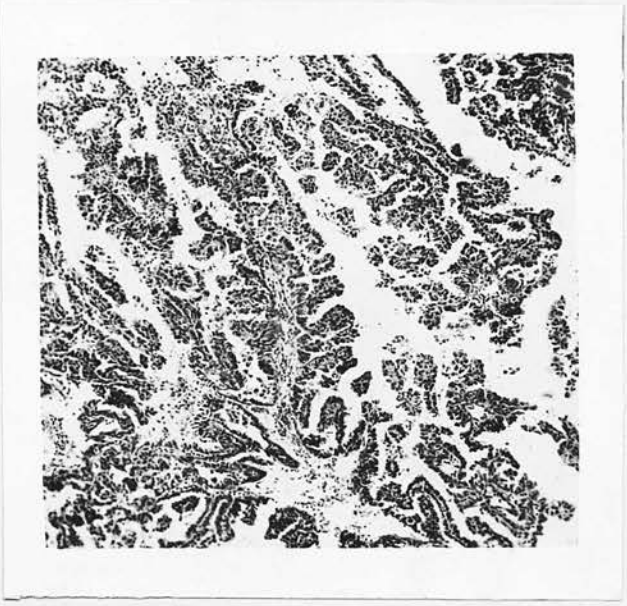
Right kidney was not secreting. The pelvis held 30 cc.s with ease. Left kidney apparently was normal.

Operation - 12.8.31. (Nitrous Oxide & Oxygen.)

A right oblique incision from the right angle between last rib and erector spinae downwards and forwards one inch above the inguinal ligament. The muscles were divided and separated to expose the kidney region. The area was found to be filled with a large tumour, 6" - 8" in diameter. It was adherent to the surrounding tissue. These adhesions were very vascular. The tumour cyst was accidentally slightly punctured, when breaking down adhesions, and a large

Case 7. Mrs Pestell.

½ Natural size.



X 70.

Photomicrograph showing the marked papilliferous nature of the tumour.

quantity of greenish-yellow fluid escaped. The cystic tumour was then more easily separated, the vascular adhesions and pedicle clamped and sutured, and the whole mass removed. The wound was closed in layers and the skin closed with silkworm gut. A rubber dam drain was inserted in the area.

"Nephrectomy" - Large hypernephroma, size of human head.

Pathological Report.

Kidney: The sections showed the tumour to be a necrosing cyst adenoma of a malignant type.

13.8.31: Urine examination - The bacteriological report - Direct films showed epithelial cells; no organisms were present and no growth was obtained on culture.

4.9.31: The patient was discharged. She was sent to a Convalescent Home with the wound soundly healed.

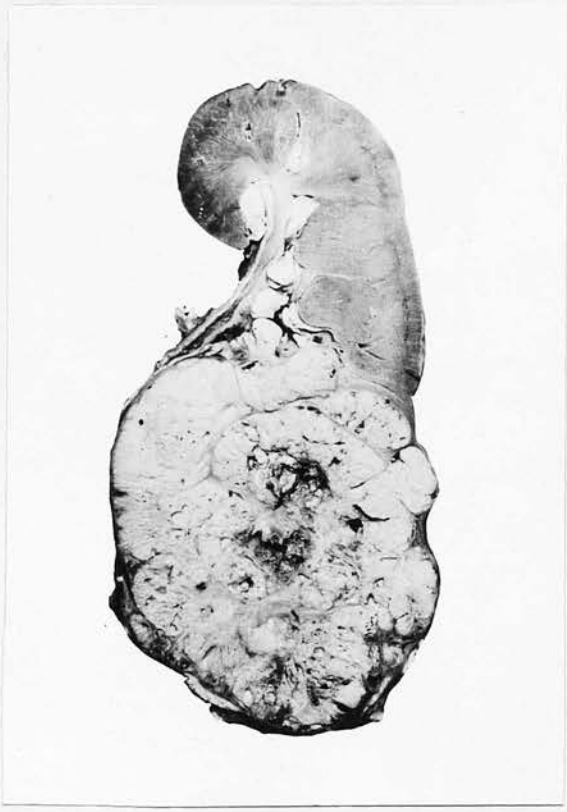
17.10.31: Reported: There was no evidence of recurrence.

Case 8.

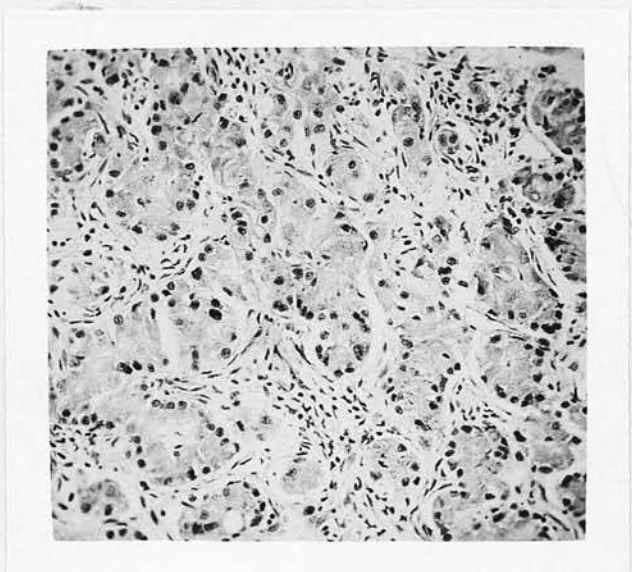
F.E., aged 70 years. 26.11.1928.

When lifting a heavy weight in August 1927, he began to pass blood in his water; there were subsequent

Case 8. Mr. Edgar.



2/3rds.Natural size.



X 100.

In this case there is attempted differentiation of the tumour resulting in the formation of rather ill-formed tubules.

Adenocarcinoma of Kidney.

occasional bleedings but nothing serious until June of 1928, when he hurt himself climbing out of a waggon, after which the bleeding became more pronounced though not very frequent, and he was off work. He was examined by a County Insurance Doctor six weeks before. Since that time there had been pain in the right side, on several occasions severe. He suffered from frequency of micturition but he drank copiously.

29.11.28: Cystoscopic examination showed great distortion of the right kidney, indicating tumour formation. The bladder wall was healthy but there was a patulous condition of the right ureter. The left kidney and ureter were normal.

30.11.28 - Operation:

The right kidney was removed. There was a large hypernephroma involving the lower pole and beginning to perforate the capsule. The patient made a good recovery. There was no further news regarding the patient's state of health.

Case 9.

Miss D. 20.11.1930.

31.5.30: The patient had a sudden attack of excruciating upper abdominal pain (right hypochondrium) with intense nausea and vomiting. There was marked

resistance and tenderness in the gall-bladder area but no tumour. The liver was not enlarged although ~~the~~ abdominal discomfort was felt for several weeks previously. The condition gradually subsided with medication and restricted diet.

End of June. There was still some tenderness and swelling of gall bladder, but only slight, and occasional twinges of pain.

July. Improvement continued and by end of month pain, tenderness and swelling of gall bladder were practically gone, but there was a small area of hardness palpable in left lobe. The patient felt stronger and better in all respects and enjoyed her food.

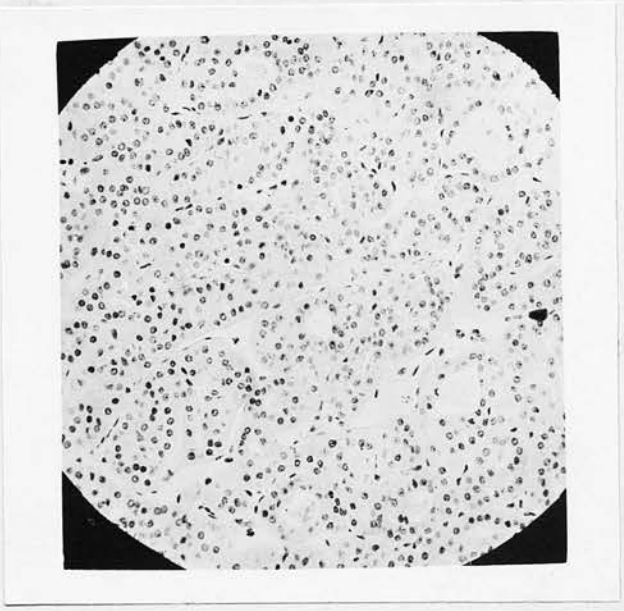
August. In the Highlands.

September 17th. The patient felt strong and well and enjoyed her meals but the hardness in the left lobe of the liver had increased and a tumour was also felt low down in the right lobe.

November 12th. Both swellings were very much larger and must have grown rapidly in the last month. They were tender but the surface was smooth. There were no swellings above the clavicle or elsewhere. Occasional twinges of pain occurred again. But still the patient said she felt well and strong, had good appetite and relished her food.

Case 9. Miss Duncan.

2/3rds. Natural size.



X 100.

The tubular arrangement of the tumour cells is well seen in this illustration.

A consultation was suggested since July but was not entertained because she felt so well.

21.11.30. An operation was performed. A very large, distended, thickened gall-bladder was found which was full of pus and stones. It was removed in toto. The bile ducts were healthy.

The surgeon found another condition which accounted for the second swelling and that was a tumour of the right kidney suggestive of a hypernephroma. It was not removed at the time - the removal of the kidney being postponed for three weeks. This was done under gas and oxygen.

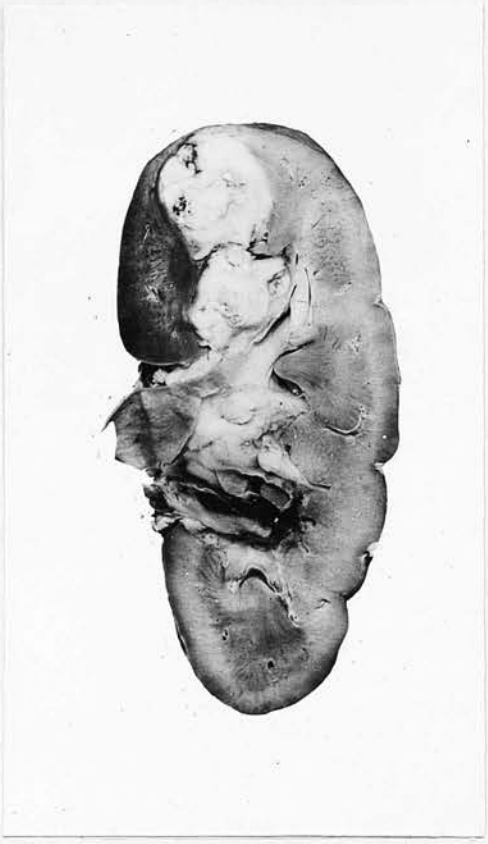
Pathological Report - 11.12.30.

Kidney - The tumour consisted of masses of cells with deeply staining nuclei and considerable basiphillic cytoplasm. In places the cells assumed an acinar formation but in the major portion of the tumour an almost syncytial mass was present - all membranes being indefinite. The whole picture was suggestive of the embryonic nephrogenic mass.

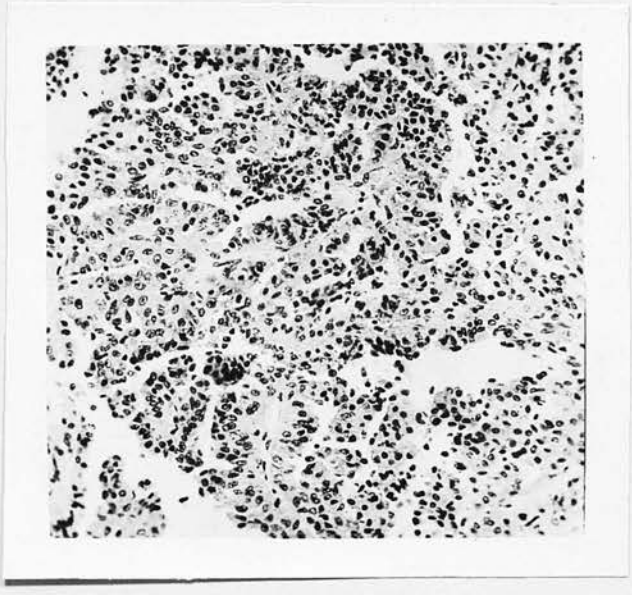
Case 10. Mrs C. 14th September, 1931.

A month before the patient noticed that her urine was blood-stained. This disappeared for a month and then recurred, but disappeared again after a few days medical

Case 10. Miss Cunningham.



2/3rds. Natural size.



X 100.

The tumour is a partially differentiated adenocarcinoma of the kidney.

treatment. There was no pain nor discomfort, but a slight feeling of weight in the back.

15.9.31. Cystoscopic examination: Bladder showed considerable amount of trabeculation, but no tumour, and bleeding did not come from it. Ureters were catheterized and a considerable dilatation of renal pelvis and calyces noted on the left side. X-ray showed some hydronephrosis of the left kidney and irregularity of iodide filling.

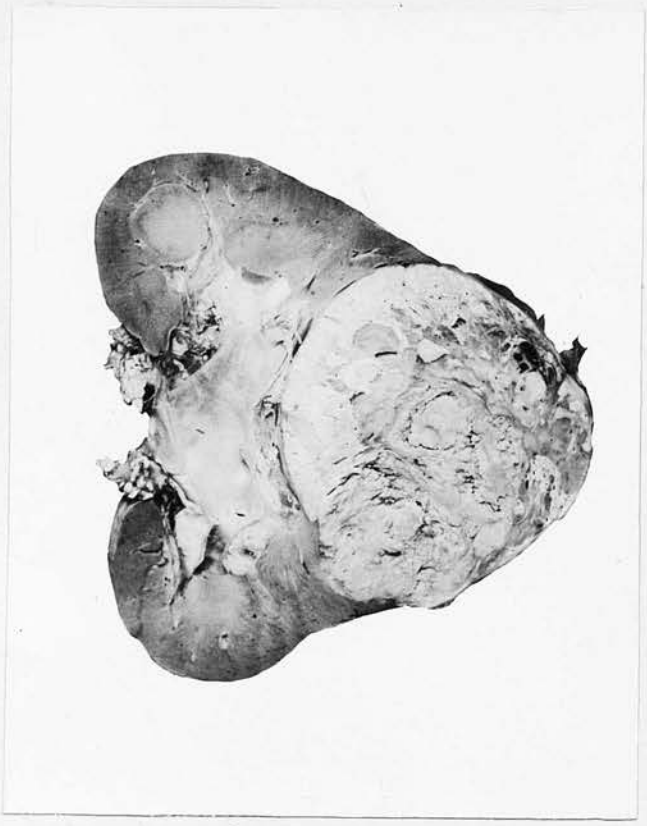
Urine examination showed blood cells, numerous pus and epithelial cells and also a considerable organismal infection.

22.9.31. Ordinary cystoscopic examination showed blood escaping from the left ureter.

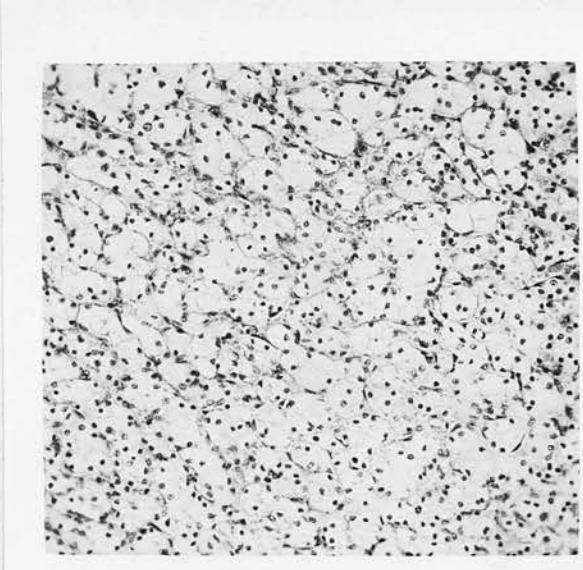
25.9.31. Operation showed a hypernephroma growing from the upper pole of the left kidney, which was excised. Good recovery.

16.2.33. Reported with pain which began under the right ribs very gradually a month before and, after disappearing for two weeks, it had reappeared and was more circular. It caught her breath and came in severe spasms. The left leg felt numb and there was slight cramp on the opposite side. X-ray showed slight erosion of the bodies of the first and second lumbar vertebrae on the left side, suggesting an early

Case 11. Miss Young.



½ Natural Size.



X 100.

This illustrates the typical microscopic features of the hypernephroma. Note the large cells with "foamy" cytoplasm, the small somewhat hyperchromatic nuclei and the complete lack of differentiation.

malignant change. Rest and codeine were the only possibilities of treatment.

Case 11. Miss Y. 14th October, 1931.

Her doctor found a distinct tumour in the left side a month before; there was also frequency of micturition due to cystitis.

X-rays taken in Peterhead showed distended caecum, dropped right kidney, cystitis and palpable liver.

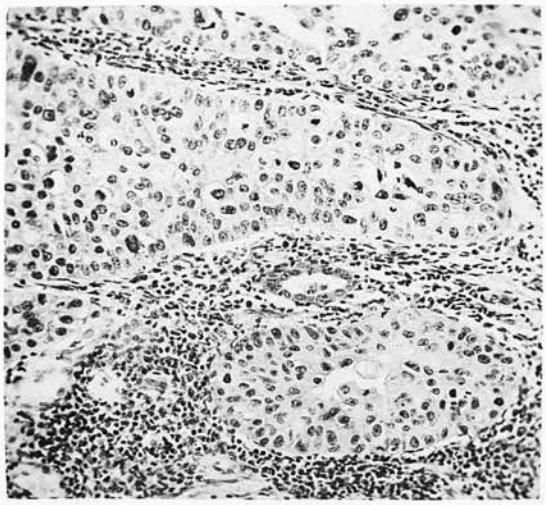
X-ray in Edinburgh suggested an extra-colic tumour.

Clinical examination revealed a nodular tumour in the right hypochondrium, tender to touch. It was thought to be either a tumour of the hepatic flexure or the right kidney. The urine examination was negative. There was no blood in the stools. There was a pronounced secondary anaemia, the haemoglobin reading 34%.

18.10.31. A blood transfusion was given.

19.10.31. Operation revealed a large hypernephroma of the right kidney, originating in the middle and projecting forwards from the anterior abdominal wall and becoming adherent to the lateral angle of the hepatic flexure. The left kidney was healthy so that the right one was removed. There were already one or two enlarged glands in the renal pedicle and the

Case 12. Miss Robertson.



X 100.

An adenocarcinoma of the kidney in which the cells in certain areas have assumed squamoid characteristics. Note the mitotic figures.

suggestion of slight involvement of the aortic group.

The only disturbance in her convalescence was a mild phlebitis of the left leg.

In October 1938 the patient's doctor reported that her left leg was swollen and the left side of her abdomen was very tender.

Case 12. Miss R. 3rd December, 1932.

The patient suffered from haematuria and renal symptoms.

Sigmoidoscopic examination revealed a small tumour growing from the pelvis and involving the upper pole of the left kidney.

8.12.32 - Operation.

The left kidney was removed. The tumour was found to be a malignant hypernephroma.

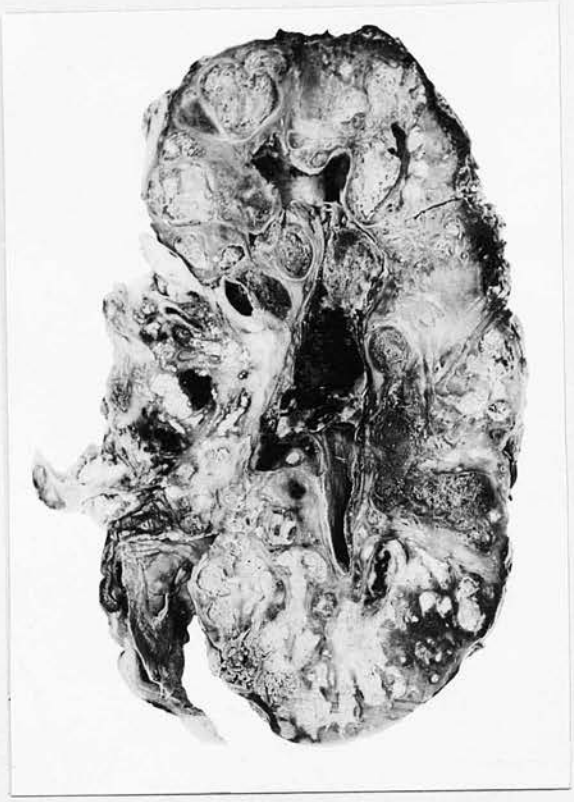
The microscopical report read: "The tumour is a carcinoma without tubular formation but with some papilliferous arrangement and marked infiltrative properties. In places the intracellular cytoplasm, vacuolation simulates hypernephroma."

Case 13.

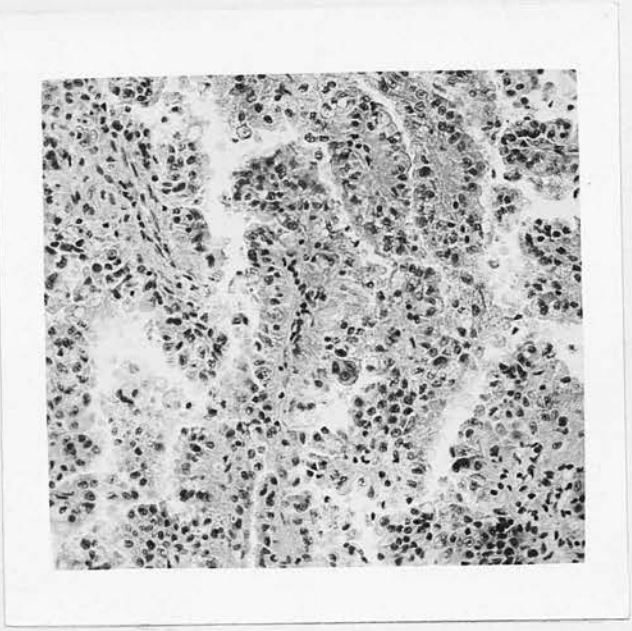
J.L., aged 62. 18th May, 1937.

After an attack of influenza last October the

Case 13. Mr Lauder.



½ Natural size.



X 100.

The tumour shows a distinct papilliferous formation. Necrosis was a marked feature of this tumour.

patient noticed that his water had become a dark brownish colour. This varied very much and he found that the appearance of a dark coloured urine coincided with his taking exercise of some sort. Since October he had had to get up to micturate at least thrice a night, whereas previously it was the exception to have to get up at night. He had no dysuria. About ten days before he got very cold and passed a lot of fresh blood in the urine. He had been in bed since then and had been passing reddish urine constantly, varying in depth of colour, and with clots sometimes present.

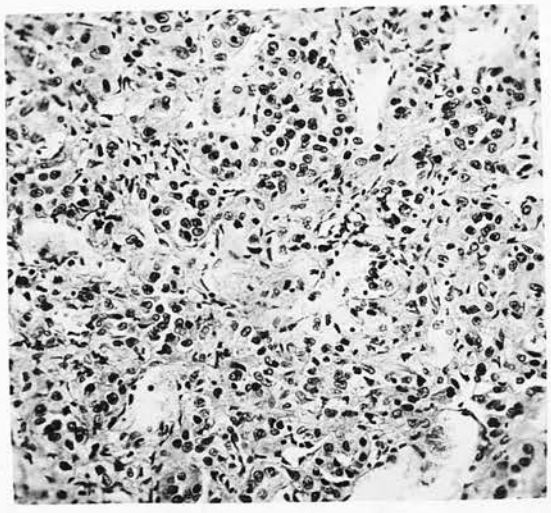
28.5.37 - Operation.

At the operation the surgeon found that a malignant tumour of the left kidney was inoperable. The kidney was freed with difficulty but the disease had spread up the pedicle and was involving a wide area, spreading towards the great vessels of the abdomen. The tumour had to be left alone.

The patient died 28.5.37.

Case 14. Mr. Hobkirk.

½ Natural size.



X 100.

A partially differentiated adenocarcinoma of the kidney.

Case 14. M.H. 27th March, 1936.

Operation under gas and oxygen. There was a carcinoma of the upper pole of the left kidney, involving the spleen and the tail of the pancreas, the disease apparently being eradicated.

4.9.36. Two months ago patient began to have pain in the back which was growing worse. X-ray showed gross arthritic changes in the lower thoracic spine and sacro-iliac joints, but there was no recurrence.

Case 15. 3.2.27.

J.R.T., aged 23, was admitted to a surgical ward in the Edinburgh Royal Infirmary, having been transferred from a medical ward. His complaint was "varicocele: swelling in left side of the abdomen".

About eighteen months previously the patient had developed a varicocele. It had increased somewhat in size during the previous nine months. Nine months prior to admission he had noticed a swelling in the left side of the abdomen, under the left costal margin. The swelling was quite painless and caused no inconvenience. It increased in size for about a month and had since that time remained stationary. For the previous two months the patient had a feeling of weakness and discomfort in the left side. On one or

two occasions he had sudden attacks of sharp cutting pains over the swelling. The pain did not radiate down to the groin. The pain usually lasted for a few minutes and then gradually passed away. There were no urinary symptoms connected with the attacks of pain.

For many years the patient had been troubled with frequency of micturition. This frequency seemed to come on when he thought that he was unable to find the opportunity to pass water, but when at his work and when his mind was occupied, he had no trouble at all. This frequency had gradually become worse. There was no history of haematuria. There was no definite history of loss of weight. His previous history gave no illness of note. His social history was good. The family history was negative.

Physical Examination.

The patient was well developed and appeared to be in good health. The tongue was clean and the teeth good.

Abdomen: Inspection.- The left side did not seem to move so freely on respiration as on the right side. There was a definite fulness in the left side of the abdomen. In addition to this general fulness there were two localised prominences, one bulging out of the upper part of the left rectus muscle and the

other bulging out of the left flank. The swelling moved up and down on respiration. When the patient lay in bed he gave the impression of having slight scoliosis with the convexity to the right, due to the bulging on the left side.

Palpation.- There was an irregularly rounded mass occupying the left hypochondrium, the left lumbar and the left iliac regions. The mass filled up the left flank. The finger could not be inserted between the mass and the 12th rib posteriorly. There was also a definite interval between the posterior edge of the swelling and the erector spinae muscle. The swelling swept round into the flank, extending down to within one inch of the iliac crest and then upwards towards the umbilicus, reaching a point two inches below the umbilicus over the left rectus muscle; it then curved upward and crossed the middle line for about half an inch. The upper border appeared from under the costal margin in the mid-axillary line and curved downwards to the right. The mass was firm in consistence and not tender. On pressing over its posterior part the patient felt a dull ache travelling from round the loin downwards towards the left testicle. The skin was freely movable over the mass. The right kidney was not palpable. The liver was not palpable

and the spleen was normal.

Percussion.- The note over the swelling was dull. The liver was not enlarged. There was a tympanitic note above and to the right of the swelling.

There was a large varicocele on the left side.

In circulatory and other systems there was nothing noted.

The diagnosis was adeno-sarcoma of the left kidney.

Urological Report was as follows.-

Cystoscopic Examination - 2.2.27. F 21 cystoscope was passed and clear urine was withdrawn. The bladder was filled, the capacity being normal. On examination the bladder walls appeared to be healthy. Both ureteral orifices were normal in position and appearance. Both ureters were catheterised to 30 cm.s. A very fast steady drip of colourless urine was obtained from the left side immediately on entering the left renal pelvis, giving one the definite impression that a hydronephrosis had been tapped. From the right side a normal secretion of slight blood-stained urine was obtained.

Plates were taken of the catheters in situ. Secretion from the left side having ceased after the evacuation of some 30 cc.s of urine, a pyelogram was taken, 40 cc. being introduced before causing slight

pain. A brisk return flow was obtained. A right pyelogram was also taken, 12 cc.s being introduced slowly, with no pain and only a slow return flow.

Radiographic Examination.- The right catheter appeared to be following a normal course. The left ureter, however, appeared to be pushed in towards the mid-line. It commenced to deviate inwards at the level of the 5th lumbar vertebra, and continued to deviate till it eventually crossed the mid-line. At the level of the disc between the 1st and 2nd lumbar vertebrae it commenced to swing outwards again, and the tip lay opposite the last costo-transverse joint at the level of the 12th dorsal vertebra and therefore considerably higher than normal. The plate showed no abnormal shadows except a large hazy shadow on the outer side of the displaced left ureter, and probably corresponding to the tumour responsible for the displacement.

Left pyelogram showed that the pelvis of the left kidney lay at a much higher level than normal, and that the organ had been rotated so that the calyces were looking downwards instead of laterally. The pelvis showed a considerable degree of dilatation, and the lower calyces were obliterated, apparently by the same force which had displaced the ureter and kidney.

Right pyelogram showed that the right renal pelvis appeared to be normal in size, position and outline.

Bacteriological Report.

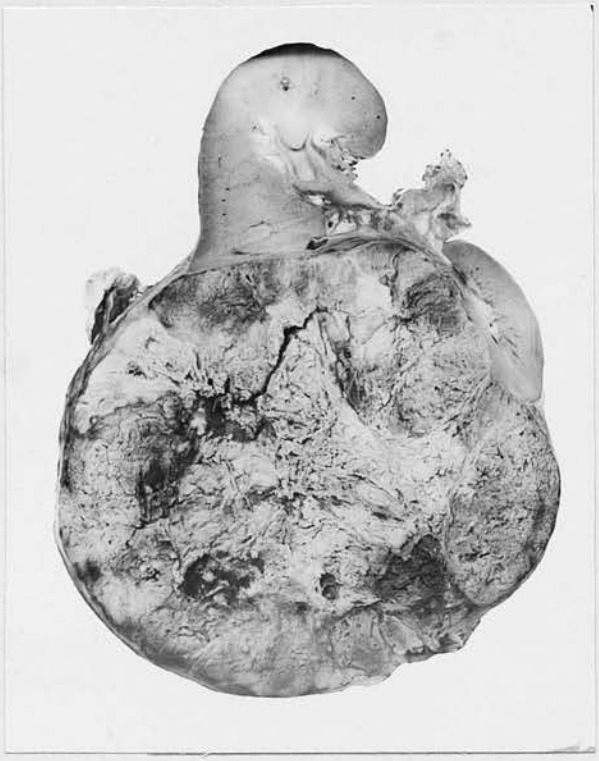
Bladder Urine - No organisms in films or on culture.

Right and left kidney urine - A few R.B.C.s: no organisms in films or on culture.

Operation - 4th February 1927. (Chloroform & Ether.)

The patient was placed on the operating table, lying slightly over on the right side. A horizontal incision was made from the lateral border of the left rectus muscle round the left side of the abdomen, then above the iliac crest to the sacro-spinalis muscle. The incision was carried down through the three abdominal muscles and the peritoneum. A large, purplish-looking, fairly hard mass was found occupying the left lumbar region of the abdomen. Before any attempt at removal could be made, the incision had to be extended to just beyond the middle line. The peritoneum on the posterior abdominal wall was incised and several adventitious adhesions to the surface of the tumour divided. A tumour about half the size of a football was, with difficulty, delivered into the wound and found to be attached to the lower pole of the left kidney. Several collateral vessels coming through

Case 15. Mr. Thomson.



½ Natural size.

X 100.

This is a well differentiated papilliferous carcinoma of the kidney.

the adventitious tissue were ligated and the pedicle was secured with very strong forty-day chromic cat-gut. The tumour, complete with the kidney, was then removed. Haemostasis was carefully secured and the abdominal muscles stitched in layers and the skin edges approximated with silkworm-gut and clips, a drain being inserted through the posterior part of the wound into the empty space.

"Nephrectomy, left".

Pathologist's Report. 4.2.27.

The tumour was a very large, soft mushy tumour of a greyish colour, growing from the lower pole.

Microscopically it was a very beautiful example of a papillary carcinoma, the cells being of the clear (fatty) type, arranged in long branching papillae, the papillae being lined with single layers of cells.

Progress.

The patient made a good recovery from his operation and his abdominal wound healed up satisfactorily. On the day following operation it was noticed that his left arm showed a very marked degree of paresis, involving the arm and the fore-arm muscles and also the supra-scapular muscles. The arm was held up in an aeroplane splint, the patient was given massage, and the paresis gradually disappeared. The deltoid muscle

was the last to regain power, and still showed some weakness on patient's discharge. There was no apparent cause for the paresis.

Radiological Report. X-ray of Spine - 21.2.27.

Marked calcification of left vertebral artery. The film showed no bony changes in the upper cervical or lower dorsal spine.

8.3.27. Patient discharged; to have massage as an out-patient.

14.11.28. The patient reported with recurrence in muscle near scar.

17.1.29. The patient was readmitted to the ward. Complaint - swelling in operation scar.

About twelve months prior to readmission the patient had a bad attack of muscular rheumatism in the trunk for about a week. Since then he had lost weight and about a month afterwards a small swelling was noticed in the scar. It increased in size slowly. Occasionally a slight soreness was experienced in this region. There had been no trouble with breathlessness or cough.

The patient thought that his varicocele on the left side had slightly increased in size. He had some pain from it. He still had trouble with frequency of micturition from time to time. There was no pain

and the stream was steady.

Physical Examination.

The patient looked fairly well and cheerful.

Local Examination: There was a small nodular swelling on the site of the operation scar towards its left extremity. It was about 2.5 cm.s long.

Palpation: A swelling was felt in the abdominal wall on the left side. It was oval, irregular in outline, with the long axis perpendicular to the scar. It lay lateral to the outer border of the left rectus. It was fairly smooth, of the consistency of hard rubber and moved with the abdominal wall. It was about 12 cm.s by 6 cm.s. A smaller mass about 3 cm.s across lay just distal to the scar and between the large mass and the skin nodule.

Diagnosis: Recurrence of sarcoma in scar.

Operation - 18th January 1929. (Chloroform & Ether.)

With the patient lying on his right side, the scar of the previous operation was exposed. An incision was made practically in the line of the old incision. The portion of skin, in which was a small nodule presumably containing tumour cells, was encircled in the incision. The dissection was deepened, the small nodule previously mentioned was removed and the main mass of the recurrence palpated in the muscles more

anteriorly. An attempt was made to excise this mass but it was found on cutting through the muscles that there was a large mass of glands and tumour-tissue lying behind the peritoneum. Consequently it was decided that operative interference was impossible. The muscles were united with catgut and the skin with silkworm gut and clips.

"Exploratory excision for recurrent sarcoma".

Pathologist's Report - 18.1.29

The recurrence closely corresponds to the original tumour removed from the kidney, being an example of a papilliferous tumour of the kidney. Branching processes consisted of a thin stroma covered by a pale fatty epithelioma. There was little evidence of infiltration. Recurrent papilloma of kidney.

Progress. After the operation the patient complained of nerve pains shooting around the left side of the abdomen.

Deep X-ray therapy was commenced while the patient was in hospital, and this was to be continued after going home.

26.1.29: Patient discharged, with the wound almost healed. He reported nearly monthly and received X-ray therapy.

30.10.29. The patient was doing no more than

holding his own. There was no increase in size of the tumour but there was no evidence of real improvement. No further news was obtainable.

SUMMARY.

The findings in cases of hypernephroma and adenocarcinoma are here considered together.

On reviewing these cases, one realises that the prognosis of operative treatment is not bad. In the fifteen cases recorded here, six were without recurrence for 3-5 years, giving a percentage of 40. Hans Haebler of Berlin, in material collected for a thesis in 1935, gave the percentage of recoveries as 22.22 without recurrence for 3-5 years.

Of those afflicted in the present record, males were in the ascendency in the proportion of nine males to six females - that is in males 60%. Thomas and Regnier, out of a large series of cases reported, gave 62% occurring in males. Ralph Thompson, from statistics at Guy's Hospital, gave the proportion of males to females as 17:12 in primary growths, i.e. 58.6%, and 2:1 in secondary growths.

In this series the side incidence was - left, 9 and right, 6, sex having no bias. Thompson's side

incidence was as 3/8 on the left side and 4/7 on the right.

The majority of cases under review were between the ages of 47 and 70. The exception was one aged 23. The oldest on published record was 82, the youngest 2.

Tumour was palpable in 53% of the cases under consideration. Haematuria was only present in 47%. The attacks of haematuria were generally recurrent often after some unaccustomed exertion. After a day or two the haematuria often ceased spontaneously if the patient rested. When active life was resumed, it sometimes recurred but often a considerable interval of time would elapse before this important sign was again manifested. Tumour plus haematuria were only present in two of the cases.

Pain was severe in 47% of the cases. It usually occurred when the growth had involved the nerves or muscles. A colicy pain was experienced when blood clots were passed by the ureter. The chief complaint of pain was a varying amount of backache.

The duration of symptoms varied from one to nine months before coming under the surgeon's care.

The tumour arises in the cortex and adjacent parts of the medulla, or occasionally in one of the pyramids at the upper or lower pole. In this series the tumour

was found in the upper pole in four of the cases, in the lower pole in four, and in the middle in two. In one of the last two, only a small patch of normal tissue remained and that was at either pole. In the tumours of the earlier stages, they were seen to be rounded and circumscribed, lying within the renal parenchyma. In others the tumour was seen to encroach upon the pelvis and calyces, producing ulceration (which caused the bleeding). The pelvis and calyces were deformed and obliterated. The renal tissue formed a capsule which in parts was imperfect. The growth extended right on to the RENAL capsule in some cases even perforating it. Broad fibrous trabeculae subdivided it into numerous lobules. The tumour at its centre was often solid, of firm consistence and golden yellow in colour, which shaded off into haemorrhagic and necrosed areas of orange, red and purple.

The tumours spread via the lumen of the tubules, by the lymphatics; the renal pedicle glands were seen to be involved, and the aortic group. In three cases the growth spread along the lumen of the renal vein. A mass in the renal vein obstructed the testicular vein and caused varicocele and testicular pain in Cases 5 and 15. The growth was seen to have spread

by continuity even into the lungs, liver, spleen and pancreas. In one of the cases, although it did not extend into the liver itself it grew up to its base and downwards into the right common iliac. The 1st and 2nd lumbar vertebrae were usually the first vertebrae to become involved. When distant metastases took place, the secondary deposits were prone to appear in the lungs and in Case 2 in the bone, as evidence the pathological fracture of the humerus which gave the first signal of the disease - and that apparently at a moderately early stage of the tumour growth. The secondary growth appeared more malignant here than the primary, as was the case in the secondary growth in the operation scar of case 15.

O. Timpe described a case of spontaneous fracture of the femoral head, due to metastases of hypernephroma of right kidney, which was wrongly diagnosed as accidental fracture. The pathological report suggested sarcoma of the femur.

But metastases have been found all over the body. Albrecht found the lungs involved in all his advanced cases. In 249 collected cases of renal carcinoma, Albarran found the lungs involved in 75, the liver in 71, lymph nodes 60, renal vein and cava 23, pleura 14. Albrecht found bone metastases in 8 of 14 fully studied

cases of hypernephroma. Osteoplastic tendencies were noted by Albrecht and giant cells were observed in large numbers at the advancing edge of the tumour. Kettle described a case with metastases in an enlarged gland. Aguirre and Nino reported a case of hypernephroma with metastases to lymph nodes. Clairmont and Albrecht described late bone metastases occurring 5-10 years after removal of the primary. In a paper by Woodruff and Levine a case of what they called hypernephroid carcinoma was described with tumour thrombus filling the inferior vena cava and right heart cavities.

The following cases have been culled from the literature which illustrate metastases not met with in the present series.-

P. Savine - Perineal metastases of hypernephroma, 1 case.

L. T. Roth and H. B. Davidson - Metastatic pulsating tumours of sternum secondary to hypernephroma.

F. T. H. Doubler - Metastases of hypernephroma to thyroid, 2 cases.

C. Pardella - Case of vaginal metastases from hypernephroma.

J. G. Sharnoff and A. M. Sala - Vaginal metastases from hypernephroma, 4 cases.

J. de Busscher - Cranial metastases of hypernephroma, 1 case.

F. Carnevale Ricci - Frontal sinus metastases of latent hypernephroma, 1 case.

C. D. Torpy - A case with secondaries in os calcis and brain.

G. de Lucas - Multiple bone metastases of hypernephroma, 1 case.

Cases have been published where tumours have been present in association with other diseases or have arisen in a kidney which is the site of a congenital abnormality. Menninga describes hypernephroma (or, as he prefers to call them, hypernephroid tumours) with sarcoma of the same kidney. Bracken described a hypernephroma with spindle-celled sarcoma. H. W. Tsen reported a case of hypernephroma presenting the clinical features of septic disease and finally of meningitis.

The histological structure of the hypernephroma is still a bone of contention among the various authorities on the subject. It is an unhappy position to be sitting on the fence even among the audience and it behoves one to join issue with one of the schools of thought after a considered judgment from the cases in hand. But first of all it may be of interest to review shortly the various theories and arguments that have led up to the conceptions of the present day.

Robin, in 1885, described the epithelial origin of tumours of the kidney. In 1867 Waldeyer traced the

beginnings of tumours of the kidney to proliferating cells of the renal tubules. The transformation of adenoma into carcinoma was recognised by Stürm in 1875. And then in 1883 there was established a theory by von Grawitz that has held to this day, although it has been assailed from many quarters. Grawitz found that the majority of alveolar growths showed structures identical with the cortical hyperplasia. He gave the following six reasons for his conclusions.-

1. Their usual position under the capsule of the kidney and in the cortex of the kidney where aberrant portions of the suprarenal body are most frequently found.

2. Their characteristic cells which are like adrenal cells but unlike kidney cells.

3. The arrangement of their cells in columns or rows resembling that of the outer part of the adrenal.

4. Their cell content - a peculiar fatty infiltration resembling that met with in adrenal cells but not in kidney cells.

5. The possession of a definite capsule even in young growths, which shuts them off from the kidney tissues.

6. In one case there was an amyloid change in the vessels of a tumour and also in the adrenal arteries - but not in the kidney vessels.

Birch-Hirschfeld introduced the term hypernephroma for the adrenal tumour of the kidney in 1892.

Then controversy arose. Richer in 1897 proved that the epithelium of renal tubules undergoes fatty

changes similar to those found in the hypernephroma. Sudeck declaimed against the theory in 1903: hypernephromas, said he, were renal adenomas. Stoerk took up the challenge. He traced the development of the alveoli from convoluted tubules with coincident transformation of opaque granular epithelium into swollen fatty cells. In these tumours he described lumina surrounded by cells which are found in the cell groups of renal tubules but not in the typical adrenal rest. He recognised that many of the features of hypernephroma were reproduced in adenocarcinomas. His conclusion, after a close histological investigation, was that hypernephromas were not of adrenal origin but sprang from archaic nephrogenic tissue.

Much further research has been given to this subject. Wilson and Willis in 1911 held that the hypernephroma arise in embryonic rests which are undeveloped areas of the kidney anlage and not misplaced fragments of the suprarenal gland. The accessory suprarenals in the kidney, they declared, are of the nature of Wolffian tubules. They agreed with Stoerk in that hypernephroma are wholly different from the adrenal derivatives and are varieties of a common type, but not in that they were derived from the renal epithelium. Ewing's view was that though most of

those neoplasms arise from original nephridial blastema yet that there are such things as true hypernephromata which start in islands of adrenal tissue embedded in the kidney. Glynn in 1912 brought forward an interesting hypothesis. Bulloch and Sequeira had shown that neoplasms of adrenal glands were associated with biological anomalies - the development of certain male characteristics in women, with diminution of female characters before the menopause, and precocity in children of either sex. Glynn found no such anomalies present with kidney neoplasms. Bovin has put on record one case of an epithelial tumour of an adrenal rest in the broad ligament of a woman of 28 years. This patient had suffered from symptoms of suprarenal virilism which improved after removal of the tumour. Casas and Pireda report on hypernephroma in a girl 4 years old - macrogenitosomia with virilism and hirsutism.

Nicholson in his studies of tumour formation has reviewed the whole subject and his conclusions may be summarised as follows.-

1. Adrenal rests are not confined to the kidneys but occur often in the retro-peritoneal tissue and broad ligaments. Hypernephroma are intra-renal.

2. The cells of the tumours with their content of glycogen, cholesterol and fat are similar to

cells in other structures though they may closely resemble the adrenal cells. (Glycogen is scanty in the normal adrenal.)

3. The architecture of these tumours is no indication of their origin, but results from the mutual pressure of swollen hydropic cells.

4. The presence of tubules reproducing the exact features of hypertrophic renal tubules, which are not observed in tumours of proved renal origin.

5. True tumours of adrenal cortex arising in the adrenal gland almost always give rise to biological secondary sexual characteristics leading to sexual precocity, with virilism, which are not manifest in tumours of the kidney.

Nicholson is convinced that the hypernephromata of the kidneys arise in the renal epithelium.

There are now three schools at the present day - the Grawitzian School who adhere to the adrenal theory; a second group who believe that there are tumours of the kidney which do originate in adrenal rests but that a large proportion of the reported hypernephromata are renal adenocarcinoma; and the last group, who doubt the existence of hypernephromata of the kidney.

From a consideration of the cases under review in this treatise, the microscopical findings lead one to believe that there are tumours of the kidney arising from adrenal rests but that variations occur not only in different tumours but in the same tumour in its

different parts which have the appearance of adenocarcinoma. The tumours undoubtedly arise in cells which show retroversion almost to a primitive type. Indeed it has been pointed out that most if not all of them arise in patches of primitive mesoblastic tissue and are therefore sarcomas if regarded from an embryological point of view though they are carcinomatous in structure. Stoerk noted that the histology is not always a safeguard to the viability of the cells, some apparently simple structures proving extremely malignant. Kidney tissue, from a highly specialised and orderly collection of cells, may mutiny and repudiate the order of things without any apparent reason. They may progress and produce adenomata or other tumours; they may retrogress and proliferate as carcinoma or the more primitive hypernephromata. The hypernephroma, however, bear strong resemblance to adrenal tissue, where the clear cells predominate.

As Mr Wade says, "The arguments offered against the adrenal theory are not substantial".

Out of the 26 cases collected, five were of the mixed tumour of children, one sarcoma, two angiomas, three malignant tumours of the renal pelvis and fifteen were hypernephroma or adenocarcinoma which have been here classified together as Group I in this series.

So that 58% were entered in this group. The percentage given by some authorities is as high as 83 for renal tumours in middle age. Garceau stated that out of 85 kidney tumours observed, eleven were small papillary adenomas, two sarcomas and no less than 33 hypernephromas. Of 92 renal neoplasms verified by operation, L. B. Wilson noted that 78% were hypernephroma. Whether those cases of hypernephroma incorporate adenocarcinoma is a moot question. At any rate the concensus of authoritative opinion is that this group forms the commonest type of renal tumour.

The alveolar carcinomas are the same as the adenocarcinoma but the cells are more plastic. They are much more malignant and grow rapidly and infiltrate widely. The tumour is not encapsulated nor is it so vascular. They do not tend to infiltrate to the renal pelvis as the papillary carcinoma. They generally arise in the middle of the kidney. This tumour is found to be more common in women than in men and occurs in middle age. The cut surface is not golden-yellow as the adenocarcinoma but pinkish grey. It has a more homogeneous structure on the surface and is softer and fleshier than papillary carcinoma. The tumour is subject to degeneration necrosis and cystic change.

Microscopically the cells are mostly spheroidal, but there are all shapes - anaplastic almost like sarcoma. The cells have a hyperchromatic nucleus and show numerous mitosis. The cells are arranged in alveoli. There are large masses with stroma between the masses. The vessels are not profuse.

Clinically there is little or nothing until the tumour is all over. Transient haematuria, dragging backache and a palpable swelling over the kidney were found.

There are special points about the operation. When the tumour is exposed, the vessels are found to be large and bleed freely. The vessels are ligated one by one. There must be a rapid mobilisation. The surgeon ligates the pedicle as early as possible. He palpates for thrombus - suspecting occlusion of the renal vein. The thrombus grows along the lumen and does not involve the wall. Drainage is essential as there is much oozing as serum collects.

The perinephric tissues are found to be invaded and adherent to the tumour, yet, because of delayed formation of secondary deposits, a complete removal of the tumour offers a fair prospect of cure.

Primary carcinoma of the kidney are among the rarest of cancers. Jocelyn Swan estimated that they

constituted not more than 2% of renal neoplasms.

The kidney is so rich in epithelial elements that one is surprised at the scarcity of carcinomas reported. Hastings Gilford suggests that the epithelium of the tubules do sometimes begin to undergo the cancer change but are halted in their progress by the flow of urine. The abnormal cells are washed out of the tubules as casts before they have time to penetrate the basement tissue.

GROUP II.

EMBRYOMA and SARCOMA.

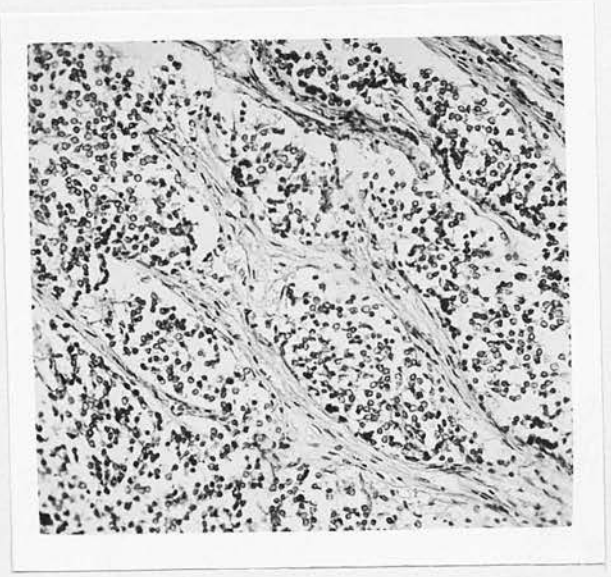
Case 16.

Wilfrid M., aged 2½ years, was admitted to a ward in the Edinburgh Sick Children's Hospital on 24.7.26. Five weeks previously he was swinging over a rope when he suddenly complained of a pain in his stomach. Since then he complained of pain off and on and it was noticed that his stomach was swelling. About seven weeks previously it was noticed that he was pale and that he sometimes cried at night. Before that he had been a particularly good child who never cried or complained. For the last week before admission he had gone off his food. Before that he had a good appetite. The bowels had been quite regular although the motions had been pale. He had no special trouble with micturition - if anything his mother thought that he had not been passing quite so often but there was always a good quantity. The appearance of the urine was normal. The child was very easily tired and from being a very active child had become languid and uninterested. He had sometimes seemed to be feverish at night.

The pain complained of was indicated in the upper part of the abdomen, about the mid-line. It came in spasms and he doubled himself up. He liked to lie on the left side when the pain came. His mother said

Case 16. Wilfred M.

2/3rds. Natural size.



X 100.

Illustration showing some of the features of an Adeno-sarcoma of the kidney.

that after the attack his stomach swelled and she had seen "cords running across it".

On examination the child was seen to be pale and thin. His eyes were rather sunken, with dark rings round them.

The abdomen was protuberant, with an obvious tumour below the left costal margin. The abdomen moved fairly well with respiration. There was no hyperaesthesia and no tenderness. The tumour was a rounded mass lying below the left costal margin, extending round into the loin. It was absolutely dull. There was a zone of resonance over the ribs above it, between it and the splenic area of dulness. The rest of the abdomen was tympanitic. The liver was not enlarged.

The operation was performed on 26.7.26 under ether anaesthesia.

An incision was made from a point in the anterior axillary line at the level of the 8th rib and a point just to the left of the middle line about midway between the umbilicus and the xiphoid process. The peritoneal cavity was opened and an enormous tumour of the kidney was found with the left colic flexure in front of it and the rest of the abdominal contents pushed over to the right.

The tumour was found to extend at the hilum of the kidney and to be invading the glandular fatty tissue there. Enlarged glands were also found on the left iliac vessels, so it was decided that it was impossible to remove the tumour. The abdomen was closed in four layers with cat-gut, silkworm gut and clips.

The child was kept in the ward until the wound healed. The general condition was quite good. He was discharged on 3.8.26. No further news was obtained.

Case 17.

James R., aged 4 years, 4 months, was admitted to the Sick Children's Hospital on 11.10.27, suffering from pain in the left loin. Seven days before the child complained of being tired and of having a pain in the left loin. He passed a fair amount of blood in the urine that night. The blood clotted very quickly. Next day the urine was reddish but gradually became clear again. He complained of no further pain since that first day and was in the best of spirits. The mother had never noticed any swelling under the eyes or of the feet. The appetite was good. There was no frequency, and no return of the initial dysuria. The child was well nourished. His

complexion was pale and sallow. There was no puffiness under the eyes and no cyanosis.

The father and mother were healthy. The child had whooping cough when two years old and scarlet fever when 3½ years. A left herniotomy was done two years before and tonsillectomy six months previously. There was no history of tuberculosis.

11.10.27: X-ray of kidneys and ureter - Nothing was seen.

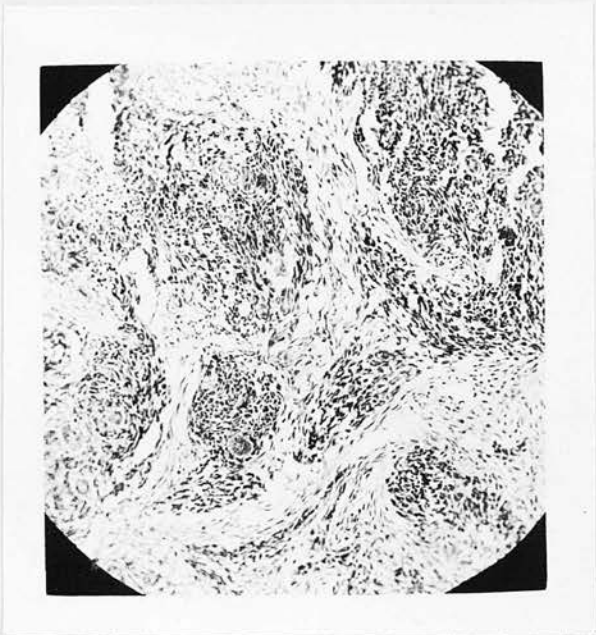
On palpation there was a freely movable mass felt in the left hypogastrium and left lumbar region, corresponding to the shape of the kidney but much larger. The fingers could be inserted between it and the costal margin. The area of fulness appeared to remain stationary throughout respiration. The spleen was not enlarged, nor the liver. There was no free fluid. The mass was irregular and about the size of a large pear and could be palpated easily and moved between the hands. The catheter specimen on 11.10.27 revealed no casts but red blood corpuscles and a few leucocytes. Sterile culture grew no organisms.

On 15.10.27 the urine passed was almost solid with blood. The motions were regular - the stools were offensive.

On 17.10.27 there was a tympanitic band across

Case 17. James R.

½ Natural size.



X 70.

Illustration showing some of the features of an Adeno-sarcoma of the kidney.

the mass - the descending colon. R.B.C. count was 4,380,000.

The operation was performed on 20.10.27.

An oblique incision 5" - 6" long was made just below and parallel to left costal margin. The external oblique was cut in line of fibres and also the internal oblique. The rectus was retracted medially. The peritoneal cavity was opened and a large kidney, irregular in size and shape, was delivered through the wound. The kidney, 4½" long, 3" broad and 2" wide, was studded with soft whitish friable growth. No secondaries could be found on palpating the abdomen, but the growth extended along the left renal vein into the inferior vena cava. The pedicle was clamped and the kidney removed - but the small area of growth abutting against and adherent to the vena cava had to be left behind. The wound was drained with a rubber dam placed in the kidney pouch. The wound was closed in four layers, silkworm gut and clips being used. Saline and glucose were administered per rectum after the operation.

Report on Kidney: The tumour was a sarcoma. The cells were small, mostly spindle-shaped in portions examined. Necrosis and haemorrhage were present only in very small areas. The tumour was invading the medulla of the kidney and in one section there was a

fairly large vein which had been invaded by sarcoma cells and filled up with a solid mass of them.

Progress was satisfactory. The general condition improved. R.B.C.s rose to 4,500,000 after taking Fe and As t.i.d. for some days, coupled with calcium lactate after breakfast each morning, in preparation for lead injections intravenously.

17.11.27: 2 cc. Colloid Lead Solution .5% i.v. - no reaction followed injection. The bowels were kept well open and the child was given plenty fluids to drink.

23.11.27: R.B.C.s were 7,290,000: Hb. 70%: W.B.C.s 8,500. There was slight rigidity over upper half left rectus. Nothing was palpated.

24.11.27: 2 cc. Colloid Lead Solution .5% was injected intravenously.

25.11.27: The temperature had risen to 100° F.

27.11.27: The child snored badly at night. Both tonsillar fossae were very inflamed. The tonsils had been removed in the hospital six months before. A large adenoid mass was felt. Sodium chlor. and Biborate mouth washes were given; boro-glycerine was applied to the lips, which were sore. There were no signs of lead gingivitis and apparently the condition was due to coryza more than anything else.

20.11.27: The general condition was much improved. The coryza cleared up.

2.12.27: R.B.C.s 3,500,000; Hb. 75%; W.B.C.s 7,500.

6.12.27: R.B.C.s 3,750,000; Hb. 70%; W.B.C.s 7,000. There was a slight painless swelling on both sides of the neck, especially on the left side. There were no definite glands felt except one or two very small ones in the left submaxillary region. The general condition was very good. There was no resistance felt in the abdomen; the appetite was good; the bowels were regular and a normal quantity of urine was passed. There was no albumin in the urine.

8.12.27: 2 cc. Colloid Lead Solution (i.v.).

9.12.27: There was no reaction to the Lead injection. There was an indefinite soft swelling on side of neck which seemed to be increasing in size, but it was quite painless. There were a few small hard glands in the left submaxillary region and left carotid triangle.

13.12.27: The thorax was X-rayed. There were no secondaries seen in the lungs. Blood film showed some anisocytosis. There was no punctate basophilia and no poikilocytosis.

The child was discharged from the ward. He attended S.O.P.D. fortnightly for lead injections,

being admitted to the ward for a few days on each occasion.

13.12.27: Weight 2.3 10/16. R.B.C.s 4,000,000; W.B.C.s 7,500; Hb. 70%.

Blood film: no punctate basophilia.

Instructions were given regarding diet and medicine.

21.12.27: Readmitted to ward. He had been home for one week and had been out a good deal. His appetite was good; the bowels were regular. He slept well and his cold had cleared up. He had been passing a normal amount of urine: it was clear in consistence and pale yellow in colour. He had no anaemia. He had a good colour and all the mucous membranes were very red, especially the inner conjunctiva. R.B.C.s 7,800,000; W.B.C.s 7,650; Hb. 90%; C.I. = .6.

Blood film: no poikilocytosis or punctate basophilia. There was slight anisocytosis.

Nothing abnormal was felt on palpating abdomen and no resistance; Mist Fe and As and Calcium Lactate were administered.

23.12.27: 2 cc. Colloid Lead (i.v.).

24.12.27: Coryza resulted, otherwise no reaction.

26.12.27: R.B.C.s 4,000,000; W.B.C.s 7,000; Hb. 75%; C.I. = .9.

Blood film - Some anisocytosis and poikilocytosis; no punctate basophilia. The child had still some slight coryza, but otherwise looked very well. He passed a normal quantity of urine; his appetite was good and the bowels were regular. There was no albumin present in the urine. His weight was 2 st. 5 7/16.

The child was discharged from the ward. He was to be readmitted in two or three weeks. Instructions were given regarding medicine.

5.1.28: A wire was received from the doctor stating that the child had severe pain, with recurrence of growth. The scrotum was very swollen and hard. The child was too ill to travel. He had not long to live.

Case 18.

Isabella P., aged 8 years, was admitted to a ward in the Edinburgh Sick Children's Hospital on 24.10.28. Two months before she began to have intermittent attacks of abdominal pain in right iliac region. This was not accompanied by vomiting or sickness and was unrelated to food. She became listless and tired. No bowel or urinary symptoms were present. The pain was moderately acute. She was off food sometimes. A fortnight before, a firm swelling was noticed high

up in the right lumbar and right hypochondrium. On admission the pain was still present but was referred to the right hypochondrium. Pain was intermittent and showed no constant features. There were no urinary symptoms or haematuria. The child was well nourished, well developed but a little pale in colour. The tongue was clean.

The abdomen moved quietly and easily with respiration. A swelling was evident on the right side of the umbilical area and there was fulness in the right lumbar region. The abdominal wall was flaccid. There was no rigidity and no tenderness. A tumour was palpable in the right flank, which was made more evident to the eye by pressure in the right loin. The tumour was firm, fairly movable and about the size of a foetal head. The surface anteriorly was nodular and irregular. The tumour was palpable both behind and in front. The finger tips could be inserted deeply between it and the liver; no connection was apparent. Percussion showed definite liver between tumour and liver dulness. The colon was displaced medially, downwards and to the left.

Respiratory, circulatory, central nervous, haemopoietic and locomotor systems intact. The urine was cloudy in colour; mucous deposit; s.g. 1020;

faint trace of albumin, negative signs of blood.

On X-ray examination there was reported a much increased size and density of right kidney shadow.

1.11.28 - Operation: Laparotomy. (Rectal ether supplemented by open ether.)

Right side: long oblique incision following the line of intercostal nerves from the tip of the 11th rib to lateral border of rectus. A vertical incision was then made 8 inches in length, paramedian in position. Laterally the muscles were divided down to peritoneum. Medially the rectus sheath was opened and the rectus abdominis muscle divided transversely. The peritoneum was incised. Omentum immediately presented at wound and was retracted at once with ascending colon. An enormous tumour was exposed, extending from high up behind liver and down to right iliac fossa, and from the flanks right across mid-line behind the peritoneum to a point two or three inches beyond margin of vertebral column. Irregular knobs and ridges were all over the surface and around plyed a plexus of small nerves and vessels. The tumour was fairly firm to touch but small areas of softening were palpable.

The tumour involved the inferior vena cava and whole of kidney pedicle. The inferior vena cava was displaced forwards by a large portion of tumour passing behind

it. The aorta was palpated and found to be passing into this extension to the left. Numerous small soft lymphatic glands were discovered in retro-peritoneal tissue. The left kidney felt healthy. The liver was smooth and healthy-looking. The right kidney and ureter - The right kidney was completely replaced by tumour; the right ureter was discovered coming out of the tumour mass. It was divided between clamps in order to give better exposure. The right suprarenal gland was not distinguishable.

The peritoneum was closed. Aponeuroses and muscular layers were sutured together as far as possible in layers. Considerable difficulty was experienced in avoiding tension. Drain was placed in flank. Skin incision was closed. Subcutaneous salines were administered during operation.

1.11.28: There was considerable post-operative shock: shock cage; adrenaline, 5 mins. 4-hourly, and subcutaneously salines were given.

2.11.28: The child was very much worse. She was very pale, her lips were blue and the pulse imperceptible.

The child died on 2.11.28.

Pathological Report: The tumour was adherent to its surroundings and was removed with considerable

difficulty, but it proved possible to remove it entire as it was surrounded by a thick fibrous tissue capsule, under which white and red masses of tumour tissue projected. It was found that the right suprarenal gland was stretched out over the upper pole of the tumour and was not involved in it.

On section the tumour was very soft and pulpy; large masses of it were occupied by haemorrhage and other parts appeared to be necrotic. At one point a little below the middle of the tumour a small amount of kidney tissue was recognisable and one of the calyces of the ureteric pelvis could be distinguished. The kidney substance contained several small white nodules of tumour growth. In places throughout the tumour minute cyst-like cavities were present, filled with a clear yellow slimy fluid.

Some of the lymph glands in the neighbourhood of the tumour were slightly enlarged and rather red. On naked eye examination it was questionable whether they were involved by the tumour and one of the largest was removed for microscopic examination.

The left suprarenal gland was healthy.

Spleen was rather large and soft and on section showed the greyish red colour familiar in acute toxaemias.

Liver was pale buff colour, fairly soft, had been compressed by the tumour but showed no very obvious pathological condition.

Thorax. Examined through the diaphragm, the thoracic serous sacs and organs showed nothing noteworthy except for the presence of a small wedge-shaped haemorrhage in the lower lobe of the left lung. There were no metastases of the tumour.

Summary. Renal sarcoma.

Case 19.

Henrietta K., aged 1 8/12 years, was admitted to the Edinburgh Royal Hospital for Sick Children on 12.1.34. Three days before, haematuria was noticed for the first time. She was not sleeping so well, nor feeding, for the last week prior to her admission; otherwise the child was thriving. The haematuria ceased after two days. There was no apparent dysuria. There was no enuresis or frequency. The bowels were regular. The child was cheerful and full of life. The father had not noticed any abdominal distension.

On examination the child was of normal size and development, and cheerful. There was fulness of the left side of the abdomen, terminating quite definitely above the pelvis. Respiratory movement was free on

both sides. There were no distended veins. The child resented palpation over the left side. There was a hard mass extending to within two inches of the pelvic brim and as far as mid-line of abdomen. There was no detectable movement on respiration. So far as could be judged the tumour appeared fixed. No fluid was detected.

The urine contained much blood and blood clots. R.B.C.s++: no casts: a few pus cells. Blood agar culture was sterile.

The cardio-vascular, alimentary, respiratory and central nervous systems revealed no abnormality.

The child had bilious vomiting and was lethargic. Blood was persistently in the urine. The tumour was felt to be nodular on the medial aspect.

The child was given X-radiation on two successive days and a week later was operated on.

The operation was performed on 25.1.34 under ethyl chloride. During the operation subcutaneous saline was given continuously into both axillas - total of 11 ozs.

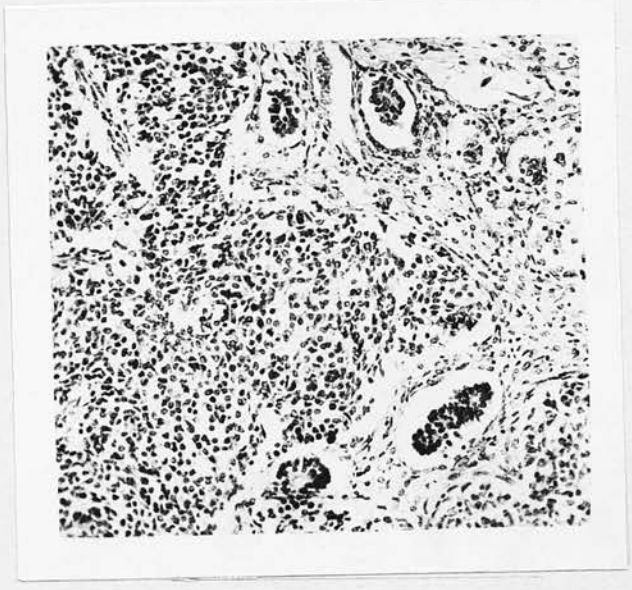
A long transverse incision was made above the umbilicus, the child lying on her back with the left side raised on a sandbag, extending from the mid-line anteriorly to the anterior border of the last rib.

The bleeding points were caught and the incision deepened through the external oblique and rectus within its sheath. The internal oblique and transversus were then incised, then the transversalis fascia, exposing the peritoneum. This was incised and the small intestine exposed and packed aside with moist gauze swabs overlying those coils outside the wound. A large malignant kidney was exposed, bound down with adhesions. This was freed, the ureter and vessels were ligated and cut - the ureter was cauterised also - and the adhesions were separated off. The tumour was about the size of a foetal head, irregular in contour and partly cystic. There was a chain of metastases along the inferior vena cava - one accidentally punctured oozed liquid matter very similar to pus. The liver was apparently normal. The bleeding points were cauterised and the wound closed in layers, the peritoneum with continuous catgut, posterior layer of rectus sheath, rectus and anterior layer of sheath with continuous catgut, internal oblique and transversus with continuous catgut and external oblique likewise, the skin with silkworm gut sutures.

At the close, 4 oz. gum acacia were given intravenously into the saphenous vein above the ankle. The child stood the operation tolerably well.

Case 19. Henrietta K.

2/3rds Natural size.



X 100.

Illustration showing some of the features of an Adeno-sarcoma of the kidney.

26.1.34: Child looked fairly well: subcutaneous glucose saline, 105 cc.s: urine N.A.D.

30.1.34: Child much better and brighter: temperature 102.8°: no cough: thorax N.A.D.

2.2.34: Child in statu quo. Intermediate sutures removed. Temperature 100.6°: Urine N.A.D.

5.2.34: Temperature 100.4°, persisted: child well: deep sutures removed.

7.2.34: Temperature 100.8°, persisted, but there was no sign of anything in lungs or elsewhere: discharged.

Pathological Report.

The tumour presented various appearances in different parts. One section showed a structure almost entirely epithelial, with well formed gland spaces lined with columnar or cubical epithelium; sometimes there was a papillary structure growing into large dilated cyst-like spaces.

Another section, which included some of the little kidney tissue remaining, showed a papillary structure composed of close-set, darkly stained, spindle-shaped cells set several layers deep on a well formed fibrous tissue core; where the tumour cells were in contact with the fibrous tissue they tended to assume a pallisade-like arrangement.

A third section showed a structure composed of solid masses of spindle cells similar to those described above, having the same tendency to pallisade arrangement when they were set directly on fibrous tissue but otherwise lacking arrangement. Here and there among those masses were small groups of round cells which had a papillary arrangement within small spaces. In this section also there were some broad bands composed of paler spindle cells arranged and fasciculi, these parts alone having an appearance really suggestive of sarcoma.

Nothing suggesting a myomatous nature was found anywhere. Inference - Parts of the tumour bore a very close resemblance to the tumours described by Ewing under the title of embryonal adenocarcinoma of renal blastoma. Although certain parts have a sarcomatous character, it is more predominantly epithelial than usual with the embryonal adenosarcoma. It would appear to be a somewhat uncommon tumour.

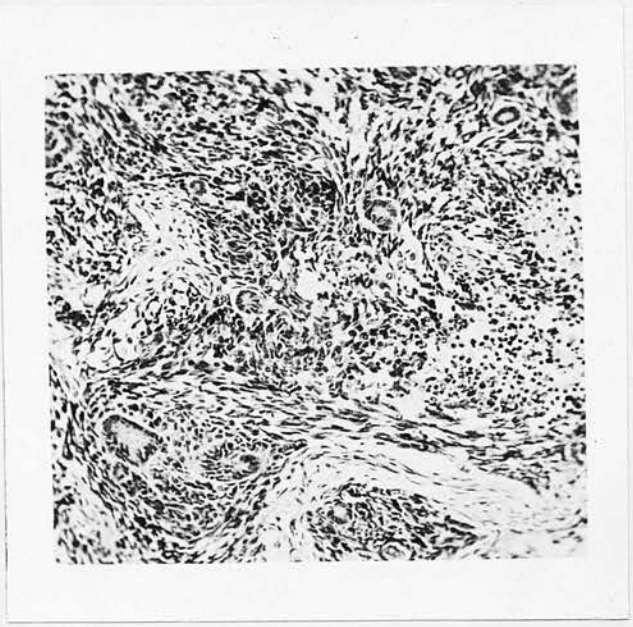
Case 20.

Mary C., aged 4½ years. 27th January, 1926.

This child had not been very well but nothing serious was apprehended. A fortnight previously an abdominal tumour was discovered by chance. It proved

Case 20. Mary Calder.

½ Natural size.



X 100.

Illustration showing some of the features of an Adeno-sarcoma of the kidney.

to be a large adeno-sarcoma of the left kidney. On 27th January it was removed with difficulty, and a portion of it escaped during removal. The shock of the operation was so great that 500 cc.s of blood were transfused from her father to her. She had four exposures of 12 hours each of 46 mc.s of radium. The child made a good recovery.

In May 1926 she reported with a swelling in the abdomen, and seemed weaker, but she cried so bitterly that it was well nigh impossible to examine her. The swelling was apparent, and it seemed scarcely credible that so large a recurrence could have taken place in so short a time unless the spleen were involved.

The last report was a letter from her mother, dated 3rd June, saying that the child was very thin and did not eat much but retained all she took and was sleeping fairly well and seemed to be breathing better.

Her death was recorded.

Case 21.

R.D., aged 36 years, was admitted into the Royal Infirmary, Edinburgh, on 1.6.32, suffering from "swellings in the neck".

The patient had noticed a small swelling in the right side of the neck ten months previously. It was painless and he stated that it had a solid feeling but was neither hard nor soft. This swelling gradually increased in size from that of a pea to that of a hen's egg. Later he noticed further swellings appearing in this region around the original swelling and also one at a higher level just over the jaw. Later still, more swellings developed on the left side of the neck and in front of the ear. He did not notice anything else the matter and no further swellings appeared, but he had felt weak for some time. He had, however, been able to follow his employment without interruption.

The patient had a cough which had been present for some years. He was a mason by trade. His right shoulder had been easily tired since the group of glands had been removed from the region posterior to the sternomastoid on that side.

During 1916-18 he had suffered from malaria. In appearance he was pale and thin.

Physical Examination. There was an enlarged gland about the size of a walnut, situated just below the angle of the mandible. The gland was regular in outline, with a smooth surface. It was firm in consistency and had a rubbery feel. It was not attached to the skin or to the deeper structures. The scar of the previous excision was present and there was some thickening round about it.

On the left side of the neck there was a similar swelling in the jugulo-digastric region, about the size of a pigeon's egg, and another in the parotid region the size of a marble. In the right groin the glands were palpable and somewhat larger than normal, one being the size of a bean and rubbery in consistence. No other enlarged glands were palpable.

There was marked atrophy of the trapezius muscle and a fibrillary tremor was present.

Respiratory system. A small sebaceous cyst was seen on chest wall posteriorly, on left side. Movement was equal on respiration; percussion was resonant throughout; auscultation - breath sounds were vesicular and vocal resonance was normal.

Circulatory system. Pulse was regular in time and force. Blood pressure was rather low. Heart sounds were soft but closed.

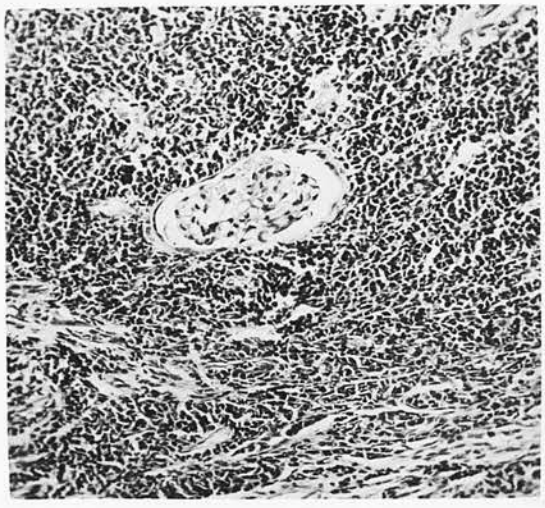
Alimentary system. There was congestion of anterior pillars of fauces. The tonsils were not unduly enlarged. The teeth were decayed. There was an enlargement of liver or spleen. Nothing abnormal was detected in the other systems.

The diagnosis was lymphosarcoma.

Progress: On the 7th June the patient commenced a course of treatment with Coley's fluid. The initial dose was 1/10 minim. He commenced deep X-ray therapy on the 8th June and had a further treatment on the 9th. On the 10th it was found that the glands had subsided in an almost miraculous manner. Further injections of Coley's fluid were given - on the 10th $\frac{1}{4}$ minim, on the 11th $\frac{1}{2}$ minim, on the 12th 1 minim, on the 13th $1\frac{1}{2}$ minims; 2 minims were given on the 15th June. This was followed by a sharp rigor. During the course of this treatment the swellings had subsided still further and those on the left side of the neck were practically imperceptible. The only swelling of any size remaining was that in the right jugulo-digastric region - it was only about the size of a bean. The patient's general condition had improved greatly.

The patient was discharged on 18.6.32. He reported at weekly intervals for injections of Coley's

Case 21. Mr. Reynolds.



X 100.

Photomicrograph shows a solitary and somewhat degenerate looking glomerulus lying in the midst of tumour cells. The tumour cells are small, oval or spherical in shape, with rather hyperchromatic nuclei. There is scanty stroma and the appearances suggest a Sarcoma.

fluid and had as much as 6 minims at a time. He had deep X-ray therapy simultaneously. The last two injections had given rise to a considerable amount of general reaction.

On 4.11.32 he was treated for a malignant growth on the posterior surface of the soft palate with 2 mg. Ra. needles into the growth in the nasopharynx through the nose and 4 (1 mg. Ra.) into the right half of the soft palate. He was readmitted on 2.5.33 complaining of pain in the chest and in the right side of the abdomen and of shortness of breath.

Physical Examination. The local condition in so far as the glands of the neck were concerned was satisfactory and no other gross enlargement was detected. He did not look well, however, and examination of the abdomen revealed a large tumour of the right kidney.

There were no urinary symptoms and the urine contained no abnormal constituents.

Pyelographic Examination was carried out and it was considered that the tumour was of a malignant nature dissociated from the primary affection. The left kidney appeared to be normal. It was accordingly decided that the right kidney should be removed.

Operation - 11.5.33. (Chloroform & ether.)

The patient was placed in the left lateral position with an Edebohls' pillow under the left loin.

The kidney was exposed by a right loin-splitting incision. Good access was obtained and it was not necessary to divide the 12th rib. The kidney was freed from the perinephric fat and was delivered into the wound. Working from behind forward the post pelvic vein was ligatured and then the ureter was divided with the cautery, between ligatures. The vascular pedicle was then ligatured doubly and the kidney was removed. The tumour was of considerable size, the organ being approximately eight inches long. It was considered that it was of an adeno-sarcomatous nature, and it was preserved for examination. The muscular layers of the posterior abdominal wall were then reconstituted with interrupted cat-gut sutures and a small rubber dam drain was placed down to the renal fossa. The skin edges were approximated with silkworm-gut and clips.

"Right nephrectomy, for malignant disease."

Progress: The patient was all right after the day of the operation but on the second day he had a very alarming circulatory attack. He became very cyanosed, his breathing was rapid, and he looked almost as though he might be suffering from a pulmonary embolus. He was given a mixture of carbon dioxide and oxygen inhalation and the usual stimulants, and after two or

three hours he slowly began to come round. He was all right after this for ten days. The drain and clips had been removed on the 6th day. He was passing between 20 and 30, and on occasion as much as 60 ozs. of urine in the day and he began to look extremely ill. His circulation began to fail and he had repeated rigors, the temperature on one occasion going up to 104°. On the day following the first rigor he came out in a herpetic eruption around the lips. He made no specific complaints at this time but on the third day he began to complain of a good deal of abdominal pain, more marked in the left side of the abdomen. The abdomen was slightly tender and a little rigid. He was not in any condition to allow of any further procedure being carried out.

Examination of the chest at this time revealed no striking abnormal features beyond a little basal moisture which could easily be accounted for by the state of the circulation. He was quite conscious throughout and, apart from the abdominal pain, seemed to be in no great distress. He required treatment by frequent injections of morphia, however, to gain sleep. It was seen that a fatal termination was inevitable and as a last resort a blood transfusion was undertaken on 26.5.33. He rallied slightly after

this but died that night, about twelve hours later. It was thought that his death and the rapid progress of the disease had been occasioned by the generalised spread of the malignant process.

Microscopic Examination (post-mortem). Examination of tissue taken from abdominal lymph gland, spleen and kidney showed it to consist of small round cells with scanty cytoplasm and circular nuclei containing a well-stained chromatin reticulum. The cells were closely packed and supported by a very scanty fibrous reticulum.

Capillaries of a wide, sinus-like character, with thin walls, were numerously scattered throughout the tissues.

Diagnosis - Small Round-cell Sarcoma.

SUMMARY.

The adeno-sarcoma of children is a rare tumour. Over a period of fifteen years only four were entered on record in a surgical ward of the Royal Hospital for Sick Children, Edinburgh. The immediate mortality is very high. Birch-Hirschfeld gave the percentage as 40. Albarran and Imbert recorded five deaths out of 41 cases up to two years, but that mortality increased with age. Of the five cases under review, four ended fatally, three to five months after operation. The fifth child

did not report after being discharged. The pathological picture was rather different in this case, the microscopic findings suggesting more of an adeno-carcinomatous change. Few cases of adeno-carcinoma in children have been recorded in the literature. Albarran, in a series of 170 cases, found four adenomas, seven carcinomas, two adeno-carcinomas and four adrenal tumours. Modern pathological diagnosis tends to place most of the so-called sarcomata among the teratoid tumours.

This mixed tumour occurs in early childhood. Of the five cases reported here, the youngest was 1⅔ yrs., the oldest 8. The intervening cases were 2½ yrs., 4 yrs. and 4½ yrs. From the literature one finds that Albarran and Imbert recorded an analysis of 165 cases of which 152 had occurred during the first seven years of life. Stiffens recorded 203 cases of adeno-sarcoma out of a review of 1213 cases and those 203 occurred during the first seven years. Various observers have recorded cases during later childhood, adolescence and later life, but these cases are conspicuous by their infrequency. Ebstein, in 1877 identified the sarcomas of infants with the carcinoma of adults.

Sex revealed no special bias. In the five cases

under review, three were girls and two boys. The left side was affected in four of the cases.

The clinical symptoms evinced in each case were varied. There was haematuria present in two of the cases - one ceased after two days, the other passed a fair amount of blood. Pain was present in three instances. It was spasmodic and intermittent, as if due to colic. There were no urinary symptoms apart from initial dysuria in one case and the aforementioned haematuria. There was no history of constipation in any case. A large tumour was present in all the cases. Duration of symptoms was one week to two months before the patient came under the surgeon's care. The temperature was slightly elevated in four of the cases, ranging from 99° to 101°. One child was discharged from hospital still running a temperature of 100.4°.

At operation, a bulky, irregular tumour was found in the kidney area which pushed aside other viscera in the vicinity. Evidence of nodulation and irregularity of the outline of the tumour meant that the sarcomatous change was widespread and portended a grave prognosis. The tumour appeared as a bluish mass, firm to touch if it were solid, soft if degeneration and necrosis were present. There were whitish grey growths without a capsule, destroying the kidney as a whole and invading

surrounding structures. The ureter was traced up to the tumour mass in two of the five cases. The renal pelvis was compressed but when the cavity was not invaded no urinary symptoms arose. In well established cases the channels were blocked by tumour tissue. The tumour was not encapsulated.

Metastases occurred early by direct invasion or by the blood stream. The growth was found to extend to the glandular fatty tissue at the hilum, the retroperitoneal glands, the iliac and aortic glands. Three of the cases showed involvement of the inferior vena cava via the renal vein. In one case the spleen was thought to have been involved from the rapid large recurrence.

The microscopic structure was that of mixed tumour in which sarcomatous elements predominated, except in the case showing mostly adeno-carcinomatous elements.

The origin of adeno-sarcoma of infants is debatable. The three principal theories advanced are.-

1. The tumour originates in inclusions of the Wolffian tissue which have become displaced and which persist among the cells of the metanephros.

2. The tumour arises from aberrant cells of the myotome and slerotome.

3. They are derived from the embryonic tissue of the true kidney.

Sir John Fraser examined these views and correlated his findings clinically and pathologically in an investigation. He found six different varieties of tissue in a tumour of moderate degree of development, viz. renal, adenomatous, sarcomatous, non-striped muscular, connective and vascular tissues. The adenomatous tissue he believed originated from a group of nephrogenic cells which, instead of developing into the tubules of the kidney, took on an erratic growth which depended upon an error in the development of the renal vessels. He further pointed out that the adenomatous tissue did not infiltrate the renal tissue but gradually pushed it aside, and that the sarcomatous tissue resulted from a metaplasia of the adenomatous tissue and pari passu vascularity increased and also the malignancy.

Differentiation and growth are antagonistic, therefore these tumours proliferated until the tumour became the malformed organ. The origin seems to be the misdirected development of the nephrogenic cord.

Sarcomata of the adult kidney are extremely rare. In the case here reviewed, the patient was 36 years old. A large tumour was present. There were no urinary symptoms and the urine contained no abnormal constituents. The patient complained of pain in the chest and in the

right side of the abdomen, and of shortness of breath. The concomitant glandular condition overshadowed the clinical picture of renal tumour. At operation a large renal tumour was found to be of a lympho-granulomatous nature. A fortnight after operation and four days before death, he began to have rigors, swinging temperature and herpes labialis, suggesting a generalised involvement. Post-mortem examination revealed the involvement of bronchial and para-aortic abdominal glands, spleen and the other kidney.

Microscopic examination showed small round cells with scanty cytoplasm and circular nuclei containing a well stained chromatin reticulum. The cells were closely packed and supported by a very scanty fibrous reticulum. Capillaries of a wide sinus-like character, with thin walls, were numerously scattered throughout the tissue.

Beneke traced the origin of certain sarcomas of the kidney to adrenal cells. But, as has been shown, tissue malformation or differentiated cell rests are not predisposed to tumour formation. They are merely not immune to it and this property they share with all the tissues of the body.

The prognosis of sarcoma, as that of embryoma, is very grave.

GROUP III - ANGIOMA.

Case 22.

D.S., aged 47 years, was admitted to a ward in the Royal Infirmary, Edinburgh, on 13.4.25.

His complaint was "pain in upper part of back (loin) left side". Duration - nine months.

In the previous June the patient had noticed that his urine contained blood. About six hours later, at night, he began to experience pain on the left side of his back, over the left kidney. The pain was of a dull, steady nature and only of moderate severity. It began gradually, got slowly worse, reached its climax and then suddenly disappeared after a few hours. The pain remained localised to the region below the 12th rib on the left side.

After this attack patient felt moderately well until August, though almost every day he had slight attacks of dull pain in the same area. In August he had another attack which was almost an exact repetition of the first. The pain was now felt slightly anteriorly on the left side of the abdomen as well as behind.

The patient again had an interval of comparative good health until January, when he had another slight attack. He again passed blood in the urine but on this occasion the pain was very much slighter and only lasted a short time. He had always been able to

work. He was a crofter.

The patient was then quite well until 1st March, 1925. He had passed a considerable amount of blood in his urine on the day before and at 10 p.m. that day the pain began and lasted constantly until 5 a.m. The pain was as bad as in the first attack. Since this last attack the patient had been pretty well and had always been able to work. As far as he knew, he had passed no blood since that time. His doctor advised him to come to the Royal Infirmary for examination.

The patient said that his stomach had always been "weak" and when this trouble started his digestive trouble became worse. Occasionally he would wake in the morning with a bad frontal headache and a feeling of nausea sometimes, followed by vomiting - of stomach contents - or retching.

His previous health had been good until 1908 when he had influenza. Since then his digestion had not been too good. He had a feeling of fulness in the pit of the stomach after food, and this made him feel weak.

He had satisfactory home surroundings and led a healthy, open-air life.

He was a moderate smoker and drinker - lately he

had been teetotal.

Family history: negative.

Physical Examination: The patient was a healthy-looking man with high colour. His muscular system was well developed. His weight was 9 st. 9 lbs.

Abdomen: Areas of erythema present on skin (a month's duration). The abdomen moved freely on respiration and was fairly well nourished. There was no alteration in skin sensation. There was no alteration in liver dulness. The spleen was not palpable. The left kidney was palpable.

Pain was felt just above the left iliac crest posteriorly, and also anteriorly to a slight extent in the left hypochondrium. He had also had pain along the line of the left ureter.

Many teeth were carious and showed pus between neck and gum in every case. Tongue was clean and moist.

Circulatory system: Mitral area - 1st sound replaced by a soft blowing sound; 2nd sound closed. The murmur was propagated into the axilla; 2nd pulmonary sound was accentuated.

Respiratory system: Normal vesicular breath sounds over both lungs.

Urinary system: Urine smoky amber in colour, acid,

contained albumin and blood: no other abnormal constituents were noted.

Urological Report - 14.4.25.

Cystoscopic examination.- Preliminary X-ray photographs showed no abnormal shadow in the renal regions or in the pelvis. A 21 French cystoscope was used and a little turbid urine withdrawn from the bladder. The bladder was filled, its capacity being 300 cc.s. The bladder walls appeared for the most part perfectly healthy and both ureters were seen to be normal in position and actively contracting. There was a large degree of engorgement of the blood vessels around both ureteral orifices and over the trigone. There was no herniation of the prostate.

Both ureters were then catheterised to 30 cc.s and clear secretion obtained from each.

A pyelogram was then taken on the left side, 45 cc.s of sodium iodide being injected slowly.

X-ray Report: The pyelograms, left, showed a well filled small renal pelvis at the level of the 2nd lumbar vertebra, dividing into two major calyces. The minor calyx was somewhat blunted in shape. There was a faint irregular patch of iodide in connection with the upper calyx, and a zone of irregular mottling throughout.

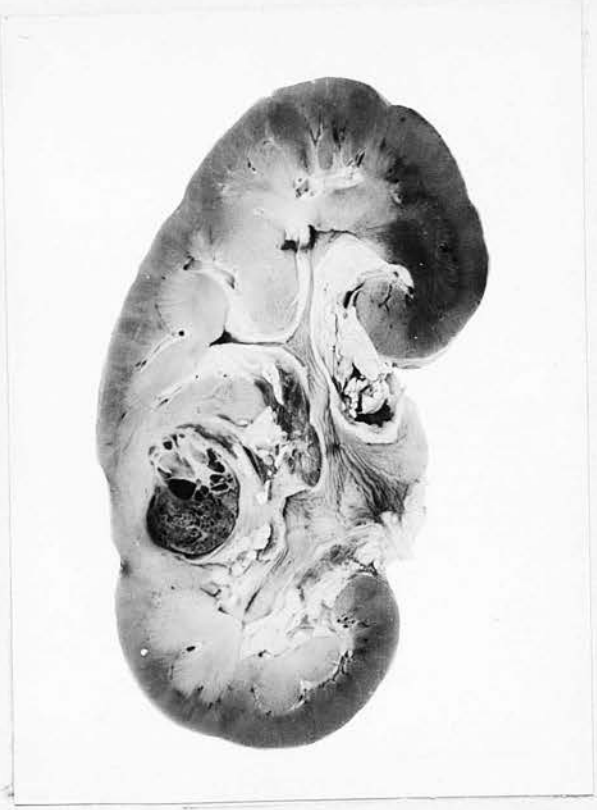
Operation - 17.4.25. (Chloroform & Ether.)

The patient was placed on the operating table on his right side, supported by an air cushion.

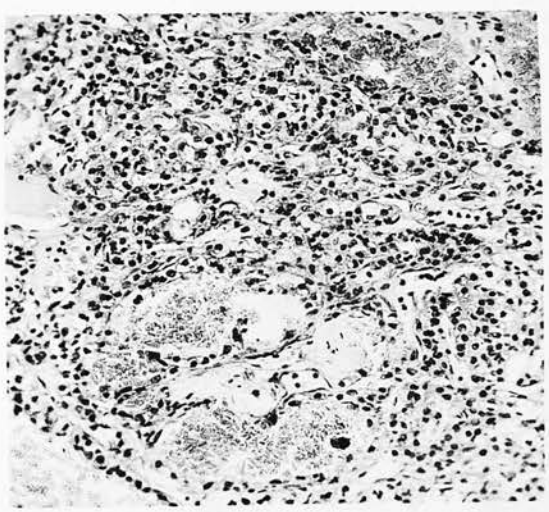
An incision, five inches long, was made parallel to the 12th rib. The latissimus dorsi and the erector spinae were divided and the quadratus lumborum exposed and a portion of it incised. The kidney was palpated and found to be enlarged and very fixed. As access was insufficient, the thoraco-costal ligament was divided. The peritoneum was stripped off the 12th rib and the rib divided with bone-cutting forceps. The 12th thoracic nerve was not injured. The cut end of the rib was wrapped round, with gauze, to protect the kidney from injury. Then, with the hand, the kidney was freed all around. An abdominal renal artery was discovered at the upper pole of the kidney. This was divided after ligation. The pedicle of the kidney was exposed by delivering the kidney out of the wound. The vessels were tied with cat-gut in two portions and the ureter ligated and divided. The pedicle was then cut across. The vessels were again tied with silk sutures to prevent any further bleeding. The tumour was situated mainly at the lower pole of the kidney and appeared to be a hypernephroma. Portions of it were cystic in appearance. A rubber drain

Case 22.

Mr. Sutherland.



2/3rds Natural size.



X 100.

Photomicrograph showing the compact and cavernous nature of the Angioma.

was inserted in the perinephric space and the quadratus lumborum sutured around with interrupted cat-gut sutures. The latissimus dorsi was joined with continuous cat-gut sutures and the skin edges approximated with interrupted silkworm-gut and Michel's clips.

"Left Nephrectomy with removal of tumour."

Pathologist's Report: "Sections show an exceedingly vascular tumour: many enlarged blood spaces: no evidence of hypernephroma structure.

Endothelioblastoma of Kidney."

Discharge - 1.5.25.

Patient made an excellent recovery from his operation and was discharged with the wound soundly healed. Before discharge, it was ascertained that the output of urine was normal in amount and that it contained no abnormal constituents.

Case 23.

M.C. 20th September, 1939.

Early in September, 1939, the patient found small quantities of blood in the urine, and there was slight frequency, but no other symptom. The bleeding came in spasms, there being none for three or four days and then bleeding for two or three days. The right kidney seemed slightly larger than the other, but not sufficiently so to be termed pathological. Microscopical examination revealed numerous red blood corpuscles in the urine. X-ray showed a somewhat increased density of the right kidney.

21.9.39. Cystoscopic examination showed a small haemangioma in the bladder base, immediately below the opening of the right ureter, and on passing a catheter there was an obstruction 10 cm.s from the ureteral opening on that side.

24.9.39. He suddenly complained of intense pain in the right kidney, and showed signs of some internal haemorrhage and considerable shock. He became white, pulse rate rose to 160, temperature was subnormal, blood pressure 110/85. He relapsed into unconsciousness. A tumour, still increasing in size, could now be felt in the right kidney.

Morphia ($\frac{1}{4}$ gr.) was given by hypodermic injection

Case 23. Mr. Currie.

½ Natural size.

X 70

An area of the tumour showing the cavernous nature of the Angioma.

and two hours later 300 cc.s of fresh blood. For forty-eight hours there was complete anuria, though he drank large quantities of fluid. When urine was eventually passed, it was free from blood. The patient's condition gradually improved.

Excretion pyelogram on 27th September showed normal function on the left side, but no renal activity on the right side.

3.10.39. The right kidney was removed. Its pelvis was distended with blood clot to the size of a large orange. It was considerably enlarged and diffusely infiltrated by a soft tumour. Beneath the kidney capsule were numerous points of telangiectatic deposit. The vessels of the renal pedicle were unusually large, the veins being as large as a man's hand. During removal the pelvis ruptured, and a large quantity of blood clot was extravasated. The patient made a good recovery.

SUMMARY.

Simple tumours of the kidney are relatively common, such as the adenoma, the fibroma or the lipoma. But they are rarely of any clinical significance, although the adenomata may grow to considerable size. They usually form small encapsulated, pale yellow

tumours. These tumours occur usually in adults. They are found in small granular cirrhotic kidneys. Microscopically they reproduce the structure of the renal tubules.

The angioma of the kidney rarely give rise to any clinical symptoms necessitating active measures of treatment, but occasionally they cause sudden profuse haematuria - the ideopathic haematuria which calls for surgical interference.

The history and clinical manifestations in the first of two cases here presented simulated hypernephroma. The patient was 47 years of age, he had backache for nine months and haematuria intermittently.

The pyelogram showed a faint irregular patch of iodide in connection with the upper calyx of the left renal pelvis. At operation a tumour was found situated mainly at the lower pole of the kidney and appeared to be a hypernephroma. Portions of it were cystic. The pathologist's report was "Sections show an exceedingly vascular tumour: many enlarged blood spaces: no evidence of hypernephroma structure".

In the second case there was slight haematuria and slight frequency but no other symptom. The bleeding was intermittent.

Cystoscopic examination revealed a small

haemangioma in the base of the bladder. A few days after this examination the patient suddenly collapsed from internal haemorrhage. He rallied after treatment. Excretion pyelogram showed normal function on the left side but no renal activity on the right side. At operation it was found that the kidney was considerably enlarged and diffusely infiltrated with a soft tumour. The vessels of the renal pedicle were unusually large.

Jocelyn Swan and Balme reported a case in 1935, with an analysis of 26 previously reported cases. The patient was young - a schoolboy - which inclined them to rule out hypernephroma, and they excluded sarcoma and embryoma because there was no easily palpable renal tumour. The pyelogram apparently did not exclude the possibility of a villous papilloma of the renal pelvis but again the patient's youth was against it. They operated and found the tumour. These observers stated that in 80% of the recorded cases the first appearance of blood in the urine occurred before the age of 40 years. Nineteen of the twenty-six angiomatous tumours were found in the kidney, most frequently in the subepithelial tissue round the base of a pyramid, whilst in eight of the cases the angioma was present at the apex of a papilla. Another interesting fact

they quoted - "In the case of angioma recorded by Kidd, Bailey and Gayet, Gabrielle and Martin, it is definitely stated that a double or bifid pelvis was found. The fact that there was a bifid pelvis suggests some congenital abnormality which might account for the haemorrhage".

Nephrectomy resulted in cure in the majority of the cases recorded.

GROUP IV - TUMOURS of the RENAL PELVIS.

Case 24.

Mrs M.W., aged 59 years, was admitted to the Royal Infirmary, Edinburgh, on 12.5.26.

Complaint: "Bleeding on passing water".

About three months previously the patient was in bed for two days with a bad cough. When she got up, on passing urine she noticed that it was dark red in colour, like blood, and she had some pain on micturition. She went back to bed and for the rest of that day and the next the urine was quite normal and she did not pass it more frequently than usual and had no dysuria. The following day, however, on passing urine in the morning she again noticed it was bright red. No sooner had she gone to bed at night than she felt a desire to micturate and she said that she passed urine that was "just like pure blood". That night, about 12 o'clock, she was suddenly seized with a severe pain in the left loin which radiated round to the front of the abdomen and down to the groin. It lasted for about four hours and the application of heat did little to relieve it. She did not feel nauseated and did not vomit. While the pain lasted she felt she would like to pass water but did not get up to do so and the desire passed off when the pain subsided. After this she was in bed for about a week and had no further attack of bleeding until four weeks prior to

admission, when she again passed dark red urine. She had since no recurrence of the pain and her urine had been quite clear. For the previous three months the patient had a bad taste in her mouth and had a very poor appetite. She had lost weight and felt run-down.

Previous Health: Always very healthy. She had a fall on her side down some rocks about six years ago and was badly bruised.

Physical Examination: The patient was rather a plethoric type of woman. She did not look very healthy. She was somewhat anaemic.

Alimentary system: Tongue clean and moist.

Abdomen: Inspection - nothing noted. Palpation - Both kidneys could be palpated. The left kidney was somewhat enlarged.

Urine contained albumin but no blood.

Circulatory & other systems: Nothing noted.

Diagnosis - Hypernephroma, left.

Urological Report - 20.5.26.

Three months history of intermittent haematuria, with on the first attack the passage of clots. Five attacks in all. At the third there was pain on the left side. She had complained of marked weakness and loss of flesh had been apparent.

Cystoscopic Examination - R.R.C. passed and healthy urine withdrawn. Bladder filled, capacity

normal: 24 F. cystoscope introduced. The bladder walls were found to be healthy throughout, except for some congestive stippling on the base. Both ureters were normal in situation and appearance.

Both ureters catheterised to 30 cm. without difficulty. No secretion obtained from the left side and on injecting sterile water only the fluid injected was returned. On the right side the secretion was concentrated and clear.

X-ray photographs were taken with catheters in situ.

Pyelogram, left: The injection of 50 cc. of sodium iodide solution caused no discomfort whatsoever.

Pyelogram, right: The injection of 10 cc. of solution caused discomfort, which was quickly relieved by a brisk return of the fluid.

X-ray Report: X-ray with catheters in situ showed no abnormal shadow. The lower pole of the left kidney was not apparently enlarged but the remainder of the renal shadow was not definite enough to indicate whether or not there was deformity or enlargement.

Pyelogram, right: Showed a normal renal pelvis and calyces of average size.

Pyelogram, left: Showed only a very faint shadow of iodide solution in the renal region. Practically

all the fluid had returned to the bladder. This indicated obstruction to the in-flow of the fluid, as the catheter had gone up the normal distance and no fluid could be obtained from it. On withdrawal of the syringe from the left catheter, some blood-stained fluid escaped.

Bacteriological Examination - Urine from Bladder and Kidneys.

Bladder - A few epithelial cells and r.b.c.s. No organisms found: no growth obtained on culture.

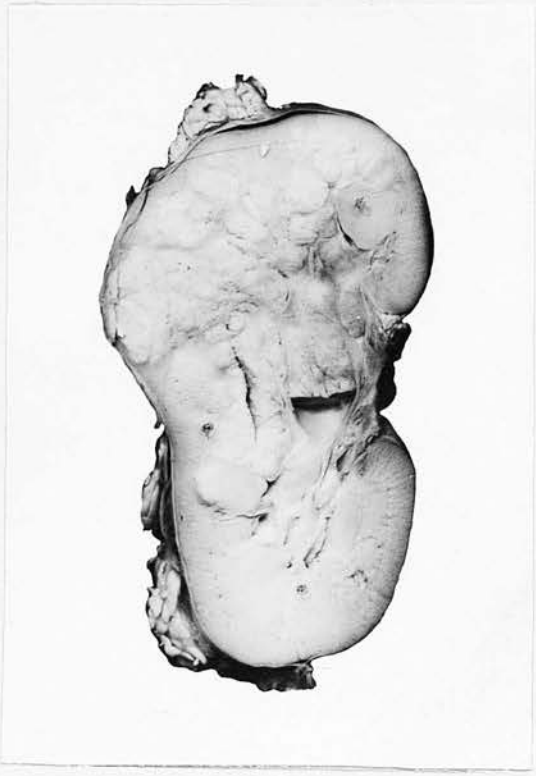
L. Ureter - An occasional r.b.c. No other cells found. No organisms found. No growth obtained on culture.

R. Ureter - Fairly numerous r.b.c.s and epithelial cells. No organisms found and no growth obtained on culture.

Operation - 21.5.26. (Chloroform & Ether.)

Patient was placed on the operating table in the semi-supine position. An oblique incision was made on the left side from the costo-muscular angle down towards the anterior superior iliac spine. The lumbar fascia was divided and the lower fibres of the latissimus dorsi muscle also divided, and the kidney region exposed. The kidney was delivered with some difficulty. There was a good deal of haemorrhage up to

Case 24. Mrs Waldridge



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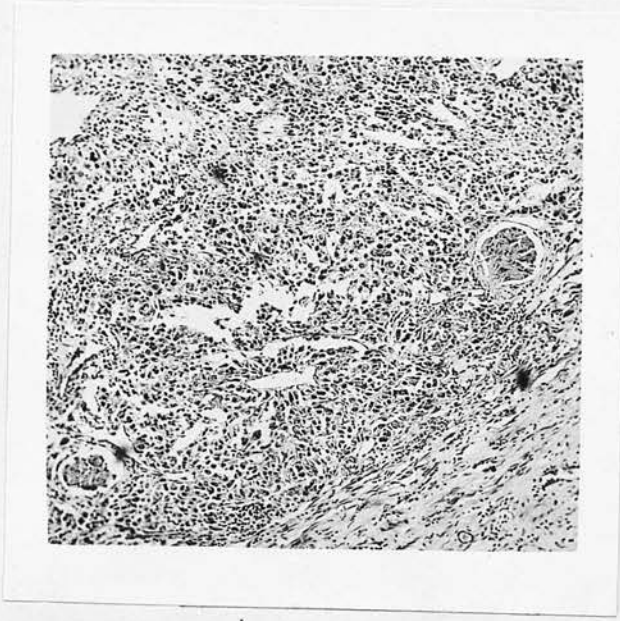


X 70.

A example of a completely undifferentiated carcinoma of the kidney.

this point, and an accessory renal artery was found. This was secured. The ureter was found, forceps applied, and divided lower down, the cut end being touched with a drop of pure carbolic. Ligatures were passed round the renal artery and vein, using a pedicle needle. The vessels were then divided and the kidney removed. The lower pole was the site of a tumour which was extending into the pelvis. Haemostasis was secured and the deep structures were secured with two layers of continuous cat-gut, the skin edges being approximated with interrupted silkwork-gut and clips.

"Nephrectomy, left."

Kidney sent for pathological examination.

Pathologist's Report: The tumour was of the type called an epidermoid carcinoma. It was seen to be invading the renal parenchyma extensively.

Discharged 5.6.26, with the wound soundly healed, patient having made an uninterrupted recovery.

Reported 13.7.27.

Re-admitted 14.9.27.

History: Subsequent to the operation in May 1926 patient felt perfectly well and free from pain for eleven months. In April of 1927 she began to feel "out of sorts", lost her appetite and became very easily tired on exertion. At that time, however, she

had no pain and there was no visible change in her urine. In July she began to have a dull, aching pain in her left side. It became worse at times, generally being fairly severe for two or three hours. It began in the back, passed round the left side above the crest of the ilium, down towards the pubis and occasionally passed down the left thigh. It was not affected by food. Patient had not noticed any change in the appearance or amount of her urine.

Water-brash was troublesome, and flatulence, but there was no heartburn.

The patient thought she had lost weight lately.

Local Examination.

Inspection - The abdomen moved well on respiration. The old operation scar was seen on the left side of the back passing forwards below and parallel to the lowest ribs. Otherwise nothing abnormal was noted on inspection.

Palpation - There was a tender area on the left side of the back, one inch proximal to the crest of the ilium. There was also a slightly tender band passing forwards round the left side proximal to the iliac crest. There was no real increase in the muscular resistance, however, and the liver and spleen were not enlarged.

Circulatory and other systems: Nothing detected.

Treatment: Patient was given a bismuth series but there was nothing abnormal found. On X-ray of the spime, however, there was found to be an absence of one half of one of the vertebrae, which fact was very suggestive of a secondary deposit.

Discharged 24.9.27 without further operative interference, to be treated with sedatives.

Case 25.

W.D., aged 68.

9.3.32. The patient had been passing blood in the urine. He had no trouble with his stools but recently they had been black. He had had pain in the left side for the last year, occasionally very acute. He was given morphia for this pain. Micturition was hot and burning and a little difficult to start. For the last three weeks he had been passing water three, four or five times at night. The general health was good but he was losing a little weight. The bowels were a little constipated and irregular. The appetite was not good.

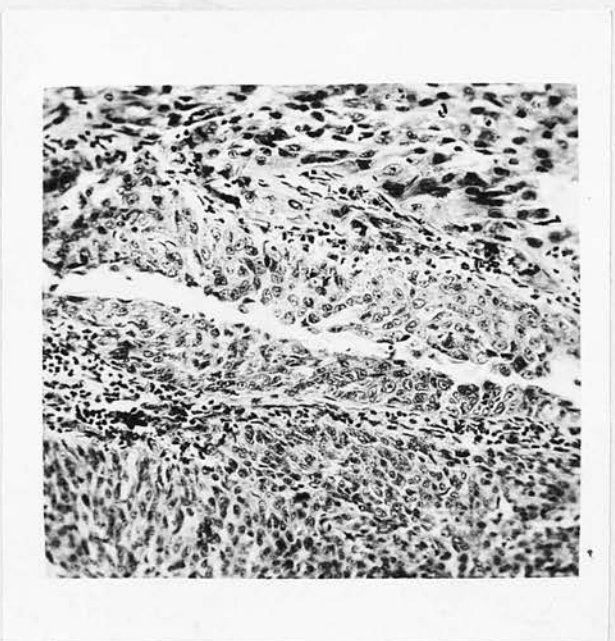
Operation - 13.3.32.

With the patient in the right lateral position, an ileo-lumbar incision was made. On opening the perinephric box, the kidney was found to be enlarged. The cortex was rather congested, but not adherent. On freeing the perinephric fat, the pelvis of the kidney was found to be infiltrating and adherent about the renal pedicle. The pedicle was exposed by blunt dissection. It was clamped and ligated. The kidney was removed. A large rubber dam drain was inserted and the wound was closed in layers with cat-gut, silkworm gut and clips.

"Epithelioma of kidney."

Case 25. Mr. Dalgliesh.

2/3rds Natural size.



X 100.

In the lower half of the photograph the epithelium is of the transitional variety while in the upper half the cells are more squamoid in appearance.

Epidermoid Carcinoma of Kidney.

Pathological Report.

This was a transitional cell epithelioma showing extensive infiltration of the renal tissue.

Case 26.

D.A., aged 54 years, was admitted to Edinburgh Royal Infirmary on 2.5.34.

His complaint was "passing blood in the water". Duration - 2½ years.

Two and a half years previously the patient was perfectly well. Then suddenly he noticed that he was passing red urine. On the same day he vomited up a black clot of blood, and the motions were streaked with red blood. He was admitted to Alloa Hospital the same day. The haemorrhages all occurred in three days but at the end of that time he became delirious. He was discharged in three weeks with no return of symptoms. Three months later he was referred to a Medical Ward in Edinburgh Royal Infirmary, where he remained for eight weeks. During that time he never had a haemorrhage. His strength, however, was very poor.

Two months after discharge he had a second period of haematuria which lasted only for three days. He now continued to have haematuria every four to six weeks, lasting for about three days. Five months ago he was admitted to the Medical Ward again for fourteen days. Since that time he had haematuria as before.

His condition on admission was as follows.-

Every four to six weeks he had haematuria which lasted three days or so. The water was bright red in colour. There had never been any pain. The bleeding always used to stop spontaneously but on the last occasion it had lasted for three months. The patient had never noticed any clots, but red streaks were occasionally present. There was increased frequency of micturition. The patient noticed that any cold applied to the skin, as of the hands or of the feet, made urination imperative. There was pain across the back when stooping or on straightening up again.

In general health the patient was very weak. There was no indigestion and the bowels moved regularly. There was no blood in the stools on examination. Sleep and the power of concentration were both impaired. There was occasional cough, producing a thick white sputum, and he got breathless easily. His ankles occasionally swelled up at night.

At the very onset of the symptoms three years ago, the patient became nearly blind. The right eye had since improved but the left eye had very poor sight. The patient noticed that if he looked at one object for some time - more than five seconds - it began to disappear and the field of vision became black.

There was no symptom to suggest a focus of

infection in the ears, nose or throat.

Previous Health. Inflammation of kidneys 25 years ago; no other illness of note.

Physical Examination.

Patient was pale and tired-looking.

Alimentary System: Tongue slightly dry and furred. Teeth carious and there was pyorrhoea.

Abdomen: The abdomen moved well on respiration and there was no abnormality of contour. The hernial sacs were closed.

Palpation: There was no rigidity, tenderness nor hyperaesthesia. The kidneys were not palpable and the liver and spleen were not enlarged.

Circulatory System.

The vessel wall was palpable. The up-strokes and down-strokes were rapid and poorly sustained.

Heart sounds were closed. There was some accentuation of the second sound in the aortic area.

Blood. Bacteriological Report, 8.4.36.

R.B.C.s 2,770,000: Hb. 26%: C.I. .5: W.B.C.s 5,600.

Respiratory system.

Nothing abnormal detected.

Central Nervous System: The blindness, which was due to partial optic atrophy, was probably the result of progressive haemorrhages.

Case 26. Mr. Anderson.

X-ray showing filling defect of the renal pelvis.

Central Nervous system: Eyesight was much impaired, and the patient "saw black" if he focussed on one object for more than five seconds.

Other cranial nerves - Nothing abnormal was noted.

There was no impairment of sensation nor motor power. Knee jerks were equal and normal. Babinski was absent.

Investigations: Pyelograms; urine and stools; blood.

Diagnosis: Tumour of left kidney.

Urological Report - 3.5.34.

History: Patient stated that there was bleeding from the mouth, the rectum and the penis. During the last three months he had had intermittent haematuria with passage of small clots of blood.

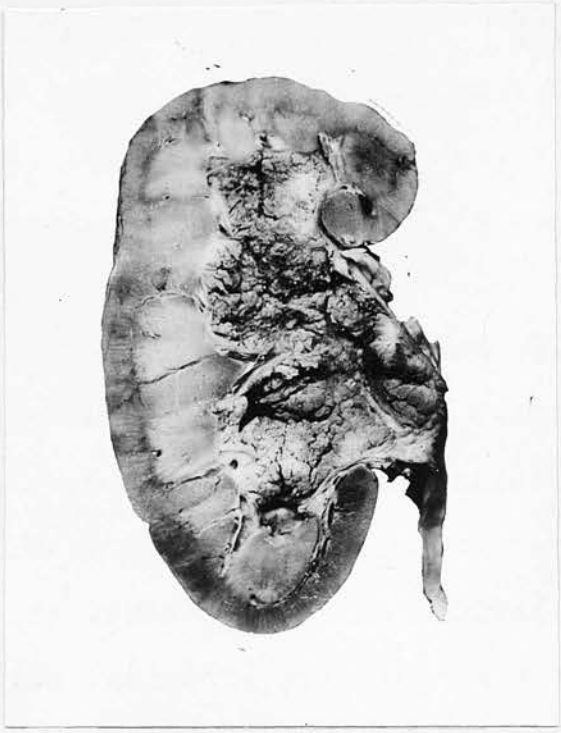
X-ray: Pyelogram, left - The pyelogram was of average size. The shadow thrown by the sodium iodide was not uniform, there being several irregular defects.

Conclusions: Patient had several irregular filling defects in the left renal pelvis. The blood was coming from the left side. The patient had diffuse papillomatosis of the left renal pelvis.

Operation on 17th May, 1934. (Ether)

With the patient lying in the right lateral

Case 26. Mr. Anderson.



¾ Natural size.

X 70.

This is an example of an epidermoid carcinoma of the renal pelvis.

position a left oblique lumbar incision was made dividing the skin and muscles. These were retracted and the peritoneum stripped medially. The kidney presented through the wound and was inspected. As it was impossible to diagnose the existence of a tumour from naked-eye examination, a small incision was made into the pelvis. Some tumour tissue was at once seen and it was decided to excise the kidney. The pedicle was therefore clamped, ligated and divided. The kidney was elevated out of the wound and the ureter stripped off the posterior abdominal wall for a distance of four inches. It was then ligatured at its lower level and divided proximal to the ligature, the kidney and the attached portion of the ureter being removed. The wound was closed in layers, a rubber-dam drain being inserted down to the region of the kidney bed.

"Left nephrectomy, for tumour of kidney."

Pathological Report.

Sections showed a diffuse tumour affecting the whole renal pelvis and proximal end of ureter. It was composed of transitional epithelium cells which in places had assumed a papilliform formation. The tumour was involving the kidney substance, spreading via the lumen of the renal tubules. Extensive

blood-spread metastasis was also in evidence.

Progress: The haematuria entirely ceased.

Discharged 9.6.34: The wound was soundly healed and the general condition was very satisfactory.

11.7.34: Satisfactory.

12.9.34: Wound broken down, complaining of pain. X-ray for sequestrum from 11th rib, divided at operation.

Re-admitted 15.2.35, complaining of haematuria.

History: During last autumn patient had been unfit for work and had felt very easily tired. He had lost some weight but had no pain. He had a very severe attack of haematuria in December, which lasted for about three weeks, and had several attacks since then. When the haematuria occurred he had a throbbing pain in the left iliac fossa. He had an occasional sharp pain in the region of the scar on certain movements. He had lost the sight of the left eye almost completely.

Physical Examination: Patient looked rather pale. There was no obvious loss of weight.

Alimentary System: Tongue slightly furred.

Abdominal wall moved freely on respiration. There was no obvious loss of subcutaneous tissue. There was a well healed scar in the left kidney region.

Palpation: There was some tenderness in the left iliac fossa and over the centre of the scar.

Circulatory and other Systems: N.A.D.

Diagnosis: Recurrent malignant disease in bladder and kidney, left.

Progress. 21.2.35 - Patient continued to have considerable haematuria while he was in the ward.

Cystoscopic examination revealed numerous papilloma of the bladder and left ureter.

Discharged 21.2.35, no operative treatment being possible.

Re-admitted 15.11.35: Symptoms as before.

History: Since discharge patient had been having repeated attacks of haematuria. The blood was intimately mixed with the urine and the patient had passed no clots. The urine was wine-coloured. The patient stated that he felt a dragging pain in the left iliac fossa. Micturition was accompanied by discomfort, although latterly patient had been subject to some frequency.

Physical Examination.-

Patient did not look very ill. He did not appear to have lost weight.

Alimentary System: Tongue slightly furred. Abdomen moved freely on respiration. The abdominal

wall was well covered. There was a healed scar in the left kidney region.

Palpation: There was definite tenderness in the left iliac fossa; this was not localised to the scar tissue.

Examination was otherwise negative.

Diagnosis: Papillomatosis, bladder.

Operation - 21.11.35: (Ethyl Chloride & Ether.)

The penis was prepared in the usual fashion and the operating cystoscope passed into the bladder. A papilloma was discovered involving the base. Trans-urethral fulguration was performed and, by diathermy, a small portion of the tumour was removed. The procedure was accompanied by considerable haemorrhage. The loss of blood was controlled by washing out the bladder with silver nitrate, 1/5000, and the injection of 1 cc. of 1/1000 adrenalin.

"Biopsy".

Tissue from bladder - Pathological report.-

Section did not show definite papilloma but a collection of malignant cells.

Operation - 5.12.35.

Operation cystoscope in bladder - papilloma had shrunk from last diathermy. Diathermy reapplied - base of papilloma fulgurated; almost whole of tumour

removed; very little haemorrhage, therefore trowelling catheter not required.

"Trans-urethral fulguration of papilloma of bladder."

7.12.35 - Discharged.

8.1.36 - Two-monthly fulguration.

The patient was kept in bed and given morphia, but gradually went downhill and died on 14.3.36.

SUMMARY

New growths of the renal pelvis are still of sufficient rarity to be of extreme interest. The diagnosis may be made from the history of symptoms, urinary findings and, finally, cystoscopy and pyelography.

In each of the three cases recorded there was sudden painless profuse haemorrhage, with more or less dysuria. There was pain in the left loin in each case. These attacks were recurrent. Ureteral clots gave pain and were passed in the urine.

The ages of the patients were 68, 59 and 54 years.

Microscopically the sections showed a diffuse tumour affecting the whole renal pelvis. The growth was composed of transitional epithelial cells which in places assumed a papilliform formation. The metastases are late and are not widespread. The papil-

lomata of the renal pelvis do not infiltrate the bases. They are like pedunculated sea anemones. Their vascular core can be seen and this is diagnostic.

The epithelioma always occurs in an older individuals where chronic irritation may be present such as leucoplakia and metaplasia. It is a typical squamous celled carcinoma usually, however, with no evidence of keratisation. Papilloma may grow from any part of the urinary tract except the anterior urethra. In one case here described there was papillomatosis of the bladder.

It is estimated that about 5-7% of all renal tumours occur primarily in the renal pelvis. Albarran in 1901 found 47 tumours of the kidney pelvis in a series of 625 renal growths. In a collection of 585 cases Albarran and Imbert in 1903 were only able to find 42 cases that arose primarily in the renal pelvis. In more recent times Hunt reported 318 cases - only 13 were growths of the renal pelvis. Scholl and Foulds in 1924 reported five cases. All the authors emphasize the importance of previous infections as a causative agent. Leucoplakia with calculi also play a part.

The treatment consists of nephrectomy and complete ureterectomy, with excision of the ureteral orifice.

The squamous cell carcinoma is the most malignant. Metastases are then sometimes early and very extensive. Hunt advises nephrectomy, complete ureterectomy and segmental resection of that part of the bladder that includes the intramural portion of the ureter. Deep X-ray therapy or radium is often administered after the removal of the growth.

The simple papilloma is benign but it has the inherent quality of spreading. This often results in very extensive growths involving the kidney parenchyma, the ureter, the bladder and even the ureter on the opposite side.

The prognosis even in simple papilloma has to be guarded.

TUMOURS of the KIDNEY CAPSULE.

It is difficult to diagnose perirenal tumours. The growth very rarely encroaches on the pelvis, so that pyelography is of little value. The plain X-ray of both kidney areas may show an extra shadow near the normal kidney outline. This may prove a valuable aid. Clinically, perirenal tumours may give rise to pressure symptoms from large growth. There may be pain with the gastro-intestinal symptoms. Cough, with expectoration, may result from pressure on the diaphragm. The malignancy may show itself in weakness, anaemia, wasting and anorexia. The growth occurs at all ages, but chiefly between 30 and 50. Women are more frequently affected than men. Both sides are equally involved. No urinary symptoms are present and no haematuria. There may be a palpable mass in the loin.

The operative mortality even of the non-malignant retroperitoneal tumours, particularly the lipomas, is high. Local recurrence of the growth is also very common and usually is of the sarcomatous type.

ETIOLOGY OF RENAL TUMOURS.

Age. Age periods have been noted in the various tumours, e.g. the embryoma of children, the hypernephroma and carcinoma of the middle-aged and older patient.

Sex. Some tumours are apparently more prone to develop in one or the other sex, e.g. the hypernephromata occur more frequently in males.

Side. The left side was more affected in this series of cases - 16 on the left, 9 on the right. The side incidence of Ralph Thompson's cases was in the proportion of 4 right to 3 left.

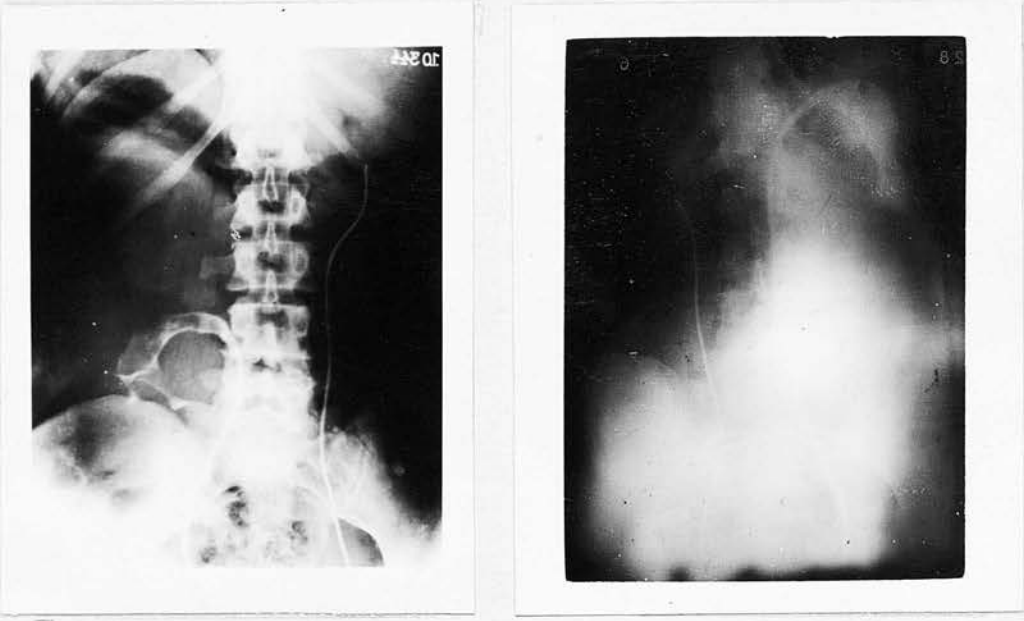
Infection. One case showed pus organisms in the urine and also some hydronephrosis of the kidney (Case 10). Chronic infection is said to be important in tumours of the renal pelvis as a causative agent, as is also hydronephrosis. Likewise a calculus which has been deposited in the pelvis of the kidney may excite suppuration. If clots or pieces of growth pass down the ureter, sooner or later infection or stone formation may occur and then albuminuria and pyuria will be present. A secondary hydronephrosis or pyonephrosis is likely to supervene. Leukoplakia is said to be a precursor of the epidermoid tumour because of the persistent irritation of the mucous

membrane lining the pelvis.

Trauma. There was a history of previous injury in four of the cases, two with hypernephroma, one with embryoma and one with tumour of the pelvis. In those cases the trauma may have aroused a dormant neoplasm rather than have started a new growth. Thomson Walker wrote that injury was stated to be a cause in 30 out of 142 cases of embryoma of the kidney. Jorns in 1935 found that trauma as a factor in the genesis of hypernephromata was not present in any of 43 cases reviewed.

Malformation. In one case there was multiple cystic disease which had been discovered at laparotomy prior to the operation for renal tumour. Wade mentioned a case of epidermoid carcinoma of a horse-shoe kidney with a large stone in the left renal pelvis. Thomas and Regnier also described a tumour in a horse-shoe kidney and Roberts reported a tumour in a kidney with double ureter and pelvis - the tumour being present in the lower pole.

Anomaly in other body systems. No anomaly was found in the present series. In the case of angioma reported by Swan and Balme a bifid pelvis was found. This suggested the likelihood of an associated uro-genital anomaly.



X-rays of Renal Tumours.

TESTS.

Serological and other biochemical tests for malignant disease are all in the experimental stage except the Ascheim-Zondek test for chorion epithelioma. The functional data given by elimination tests and chromocystoscopy are always doubtful.

Stein and Stewart perfected the technique of pneumoperitoneal examinations and introduced them to this country. By this measure they obtained accurate visualisation of the kidneys, determining their size, shape and position. They found the technique was of the utmost value in diagnosing renal tumours, particularly when there was doubt as to the origin of a tumour mass. Carelli of Buenos Aires further developed the technique of gas inflation and by his method of perirenal injection the kidney was satisfactorily visualized. This was of particular value in cases in which one wished to show the upper pole of the kidney. This diagnostic procedure, unfortunately, has not been adopted in any great measure in Britain.

The most important tests used in this country are:- The radiological examination either by simple radiography which by perfection of technique may visualize the contour of the renal shadow or again by descending radiography or ascending pyelography, which

give very characteristic findings and pathognomonic evidence.

Sufficient experience has now accumulated since the introduction of intravenous urography to justify the opinion that this procedure is the most outstanding and noteworthy advance made in roentgenology during the past few years. It is of course essential that the radiologist should acquaint himself with the history and clinical findings of the patient before making the intravenous examination. As a guide to procedure an attempt is made to find out the nature of the tumour by this means.

In the order of frequency, the indications for urological examination in juveniles are: pyuria, disturbances of urination, tumour, haematuria and pain. In practically all of these examinations urography should be resorted to; cystoscopy and pyelography are most often employed, urethrography is a less common procedure. The urographic diagnosis of renal tumour in infants relies on the appearances of pelvic distortion, displacement, elongation and obliteration.

Therapeutic radiation tests over the tumour mass is often convincing with tumours of a sarcomatous nature.

T R E A T M E N T.

Nephrectomy will be indicated if the disease is confined to that organ and the opposite kidney is normally functioning. If the growth involves the kidney, that organ must be sacrificed. The peri-nephric tissue should be excised as widely as possible and the renal pedicle left as short as is consistent with safety. If the tumour is not attached, the tumour alone is removed. Before nephrectomy is under-taken, adequate preliminary investigation must be made.

Deep X-ray therapy has been employed prior to operation with a view to reducing the size of the tumour, thus making it operable. Deep X-ray and Radium therapy are recommended after operation. Some authors rely on that treatment alone.

CONCLUSIONS.

One cannot insist too much upon early and accurate diagnosis in renal tumours. The value of certain symptoms such as haematuria, enlargement and deformity of the kidney, pain and the presence of symptomatic varicocele must be appreciated and a diagnosis reached by a complete and full investigation. If the

surgeon's aid is sought at an early stage, a better prognosis can be given. The only cure for a tumour of the kidney is nephrectomy.

In the preparation of this Thesis I must acknowledge with gratitude my indebtedness primarily to Sir John Fraser for affording me the facilities of his Department, as well as for providing material for most of the cases; and to Miss Herzfeld and Mr Mercer for their kindness with certain other cases.

My thanks are also due to Dr Wilkinson for permission to record two cases of angioma, which he is in the process of publishing. I am also under obligation to Miss Brown of the Royal College of Surgeons' Library for her unfailing courtesy and patience.

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